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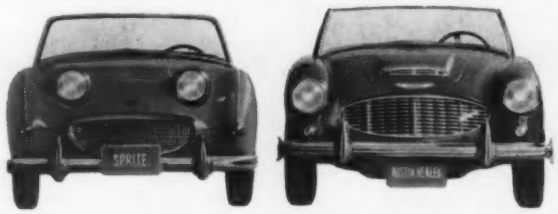

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Black Star photographer Jim Katzel managed to catch, for this month's SCI cover, Jim Hall, Dallas, Texas, (foreground) and Joe Heppenstall, Glenside, Pennsylvania, during that mouth-drying second before the start of a Formula Jr. race at Continental Divide Raceway. Young Hall (see page 69) and his older brother Chuck of Boulder, Colorado, are drivers to watch in the future.

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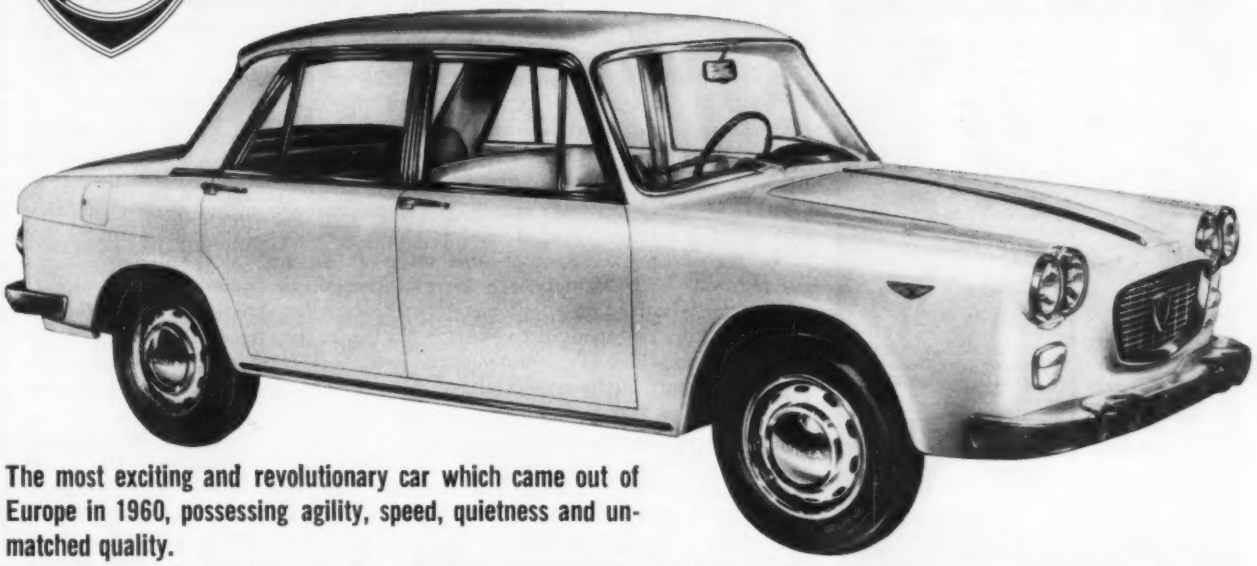
SENSATION OF THE TURIN AUTO SHOW COMING TO AMERICA SOON



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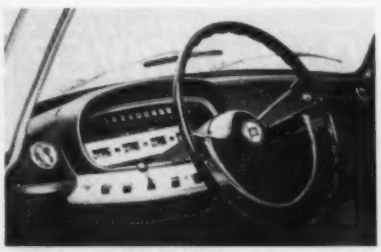
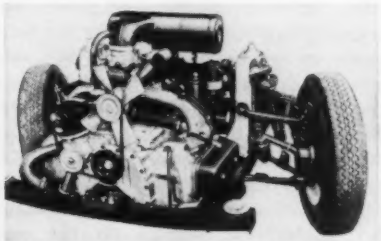


Leather-covered dash features big, easy-to-read gauges, and tachometer. Control switches are grouped in crescent-shaped unit under driver's left hand.



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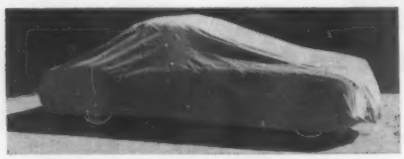

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OBSERVATION AND OPINION

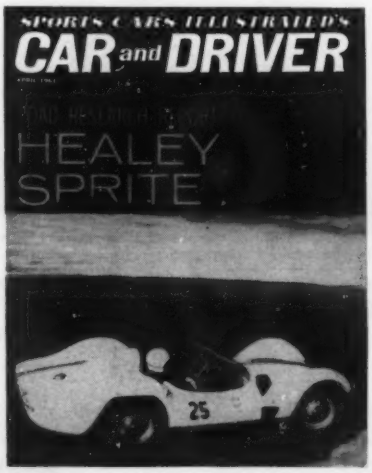
HALF-WAY THERE – Remember SCI's "ideal but practical touring sports car" from this column in the October, 1960 issue? European Editor Jesse Alexander just bought a remarkable automobile that's brought him closer to this dream machine than anything we've heard of yet. It seems Mercedes-Benz *did* build at least one 300SL gull-wing coupe with the low-pivot swing axle used in the later roadsters! They fitted the interior with full racing-type seats and four-spoked wheel just like the 300SLR and bodied it completely in aluminum. Jesse is now the proud owner of this unique car, which is due to be fitted with disc brakes as soon as they're available on the production 300SLs (early in 1961, we understand). All he'll need then are the Borrani wheels, the Ferrari engine and gearbox – and, of course, the air conditioning – to complete the specification. To you, the reader of SCI and CAR AND DRIVER, this means we'll be able to cover the European scene with unprecedented speed!

SENSIBLE SPEEDS – We've always campaigned vigorously against the view that speed is a prime cause of road accidents. Certainly today the emphasis has to be placed on maximum possible safety at the highest possible speeds, or our highways will succumb even more to the creeping paralysis that's already reached an advanced stage. One state with extensive experience with relatively free speed laws and modern freeways is Michigan. In view of this it's significant that Michigan's highway commissioner, John C. Mackie, recently urged a convention of state highway officials to press for realistic speed limits on our rapidly growing interstate highway system.

Mackie's key point, based on accident studies on Michigan's freeways, was that most mishaps were caused by cars that were moving markedly *slower* than the main traffic group. Drivers either slam into these mobile obstacles or indirectly cause accidents in other lanes by their efforts to dodge around the dawdler. His recommendation to Michigan is a minimum speed of 40 mph for freeways, and a maximum of 75 mph, to be cut to 65 mph at night. Mackie suggested a similar minimum and a maximum of 75 for the entire interstate highway network. Our feeling is that this would be an excellent step in the right direction, but that the range between maximum and minimum is still too great; accidents would still be encouraged. For major interstate roads, especially those with only four lanes, 50 mph would be a far better minimum. For those who want to travel slower there are still many perfectly good former main roads that can now be considered secondary. It has to happen. Express traffic in this vast country deserves exclusive express routes.

INTERNAL AFFAIRS – We point with pride this month to the addition of two names to our roster of Contributing Editors. First is Wayne Thoms, who's been covering West Coast cars and racing for us and whose Land Rover road test is in this issue. In CAR AND DRIVER, next month, Wayne will bring you the lowdown on competition tuning for the Bristol six, and in collaboration with Racer Brown he's preparing a similar piece on the pushrod Porsche.

The second addition is Steve McNamara, a name new to this list but well-known to our readers. Steve's SCI pen portraits of Jim Rathmann, Enzo Ferrari, Tony Brooks and Dan Gurney were definitive in each case. Next month's CAR AND DRIVER carries Steve's latest on Bill Krause, a driver who's very much arrived on the scene, and you can expect many more McNamara profiles on the outstanding personalities of the automotive world.



We make these additions with one specific goal: to keep CAR AND DRIVER, like SCI, the only truly national magazine for automotive enthusiasts. Remember, look for CAR AND DRIVER on your news-stand on March second!

—Karl Ludvigsen

THE ABC OF SUPERCHARGING

A. The power output of any engine is limited by its ability to take in air or breathe. Supercharging is a mechanical method of forcing the air/gas mixture into the cylinder under pressure instead of using the piston to suck it into the cylinder. A supercharger simply places more of the mixture behind each power stroke of the piston and distributes the mixture evenly thus increasing the power of the engine. Supercharging is the positive and dependable method of obtaining more power. It is done by making the engine more efficient thru increased torque and not increased speed. The engine develops more horsepower at the same RPM. Because of the increased efficiencies afforded by supercharging practically all transcontinental trucks, busses, locomotives and airliners are supercharged. Supercharger manufacturers claims of 40% to 50% more power are not exaggerated sales claims. It is an engineering fact that a manifold boost pressure of 6 psi will increase horsepower 41% to 52% depending on cam configuration and engine design.

B. The Judson Supercharger is an automatic device that replaces the vacuum in the intake manifold with a pressure only when and as additional power is required. This is determined by throttle opening. The engine is not constantly supercharged as the extra power afforded by the supercharger is not needed at normal cruising speeds, idle or general traffic driving. When the accelerator is suddenly depressed, however, the engine immediately becomes supercharged and the car takes off like a rocket. The engine is not continuously supercharged but only when you need or want additional power to pass, maintain power on hills or for rapid acceleration. Supercharging your car is just like adding two more cylinders to the engine and you will have as much power or torque available in fourth gear as you now have in third gear. The engines for which Judson has supercharger kits available are all more than rugged enough to take low pressure supercharging without affecting engine reliability.

C. Supercharging is a matter of degree. Racing cars that are supercharged operate on a manifold boost pressure of 15 psi to 30 psi. This is high pressure supercharging and the engines are specifically designed for it. The Judson supercharged engine operates on a maximum manifold boost pressure of only 6 psi. This conservative amount of supercharge provides 45% more horsepower on demand and enables the engine to operate well within the safety factor designed into every engine by the manufacturer. The fact that the engine is supercharged automatically in proportion to the load placed on it together with the low pressure supercharge eliminates the possibility of the Judson Supercharger damaging the engine in any way. There are over 65,000 Judson Superchargers bringing improved performance and complete satisfaction to their owners everywhere. Testimonials from owners and extensive road tests made by every leading automotive magazine in the world prove conclusively the efficiency and reliability of the Judson Supercharger.

Why not supercharge your Sprite, MG-A, TR-3, Mercedes 190 SL, Volvo, Volkswagen, Volkswagen-Ghia or Renault Dauphine? Complete supercharger installations in the form of bolt on kits are available for all of these cars. A supercharger will provide you with amazing performance. You can pass when you want to and have extra power when you need it. Write to Judson Research and Mfg. Co., Conshohocken, Penna. for performance data and literature on supercharging your car. Let us show you how you can get more power, better performance and a new thrill in motoring pleasure by supercharging.

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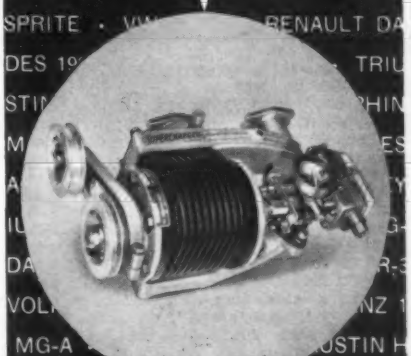

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LETTERS

TAKE HEED, GM

I see from your Road Research Report on the 1961 Corvette (December, 1960) others have had accelerator pedal trouble too. I own a '60 Corvette and have found the pedal tends to hop out of the rubber studs holding it in place. In many cases when dragging I rammed my foot to the floor only to find the accelerator had become disconnected. In one tense situation the pedal landed on my lap when I was a good two car lengths ahead of my opponent. On the return ramp I threw the pedal out the window to the amusement of spectators. I found using the remaining lever much more effective.

To remedy this situation I think a pin pivot would be much better than the cheap rubber studs. Hope GM hears.

Ronald Colombo
Pearl River, New York

HOTTEST HEALEY IN OKINAWA

On page 38 of the September 1960 issue, you had an article by Dennis May on the "Hottest Healey 3000" showing a special feature of three carburetors.

Perhaps you will be interested in the "Lyson prepared" '57 Austin-Healey also having three S.U. carburetors. We have had that since 1958 so Dennis May's isn't so very new; however, after reading his story, we can guess what the horsepower of our Healey is. No one here in Okinawa has a chassis dynamometer, but she outruns anything on the airstrip – except the Air Force jets.

Lloyd Lyson
Okinawa Sports Car Club
Okinawa

CREEPING NOSTALGIA?

With reference to Pete Lovely's letter (November, 1960), I take it upon myself to make the following observations.

First of all, Mr. Lovely has been at the game for some years. It's obvious from what he says that nostalgia is creeping in. The Good Old Days, ten years ago, when one held a flag or a stopwatch or someone's hand when one wasn't driving have passed, but with many regrets.

I've been associated with the sport for the last ten years both in Canada and the United States. It has certainly grown and with this growth have come, naturally, growing pains.

Along with Mr. Lovely, I well remember when it was only necessary to paint numbers on your TC, pay your entry fee and have a bash. On the other hand, I recall there were very few spectators. This was fortunate since the general public regarded us as hot rod merchants and stayed away in droves, leaving us free to run our own show.

Later, more cars were imported. One still sees an occasional Triumph or MG cluttered up with whitewall tires, luggage racks, club badges and all that goop. After a while their owners will discover they are carrying around unnecessary weight and that a sports car is a fairly basic thing and needs no embellishing.

I have deviated from my theme. Sports cars, over the years, have commanded a very definite place in the public eye. Persons sponsoring races or hill climbs these days must have a regard for the spectator, his dog and children. In order to build fences to protect them, we must advertise the events to draw a crowd, and then pray for fair weather so there will be enough "gate" to pay for the facilities.

During the period of which I originally spoke, a good many changes have taken place, of which Mr. Lovely is not unaware. In fact, he's pretty definite in his opinions concerning them.

Mr. Lovely, look at it this way. Has there ever been a sport in this country which hasn't first of all been exploited and later on professionalized?

Mrs. Pat Sword
Racine, Wisconsin

OTHER "ONLY NEW BUGATTIS"

I saw Mr. Purdy's article in the December issue on a Type 46 Bugatti which he claims to be "the only new Bugatti."

In this connection I thought you would be interested in a letter which I received from Jean de Dobbeleer, dated July 26, 1960, an excerpt of which is enclosed herewith.

(Translation from the French.—Ed.) "I want to inform you of some very rare, absolutely new (zero mileage) cars which are respectively unique for their type. They are, of course, Bugattis; among them is a supercharged four-cylinder 1500 cc single-seat racing car, with dual overhead cams, Lockheed brakes and synchronized transmission. The Bugatti Book doesn't mention it. It is not, however, fabricated by an amateur from parts of different sources; it's an *original* car. I have also a Type 53, a Type 41 and a Type 64 (without a body). The prices are high, but we are talking about one-of-a-kind collector's items . . . ."

It therefore seems to me that our friend Ken's title of the "Only New Bugatti" does not seem to be correct. Maybe he should stick to telling people on the radio how to get their cars out of the snow in winter.

A. E. Goldschmidt
New York, New York

TTC THANKS SCI

On behalf of the Tonawanda Touring Club, I would like to thank you for your kindness and generosity in your coverage of the Third Annual Braille Rally (SCI, November '60). Needless to say, we are gratified by the interest which other organizations have taken in our friendship with the New York School for the Blind in Batavia, New York. Because of your kindness in covering our event, I have at present received two inquiries from other sports car clubs which are interested in conducting similar events in their areas. As they will discover, this event is more fun for the drivers possibly than it is for the children.

I would also like to thank at this time cooperating sports car clubs in the western

(*Continued on page 8*)

The magic is in the metal!

And the metal is aluminum— Buick's new aluminum V-8 that gives the Special big-car go on small-car gas

How come the engine and automatic transmission* on the '61 Buick Special gives you *twice* the pow per pound of most compacts? Just take a peek under the hood.

Its 155-h.p. Fireball V-8 is made of *aluminum.* It weighs in at a trim 318 pounds — up to 200 pounds less than engines with only two-thirds its power. Its power-to-weight ratio—.487 horsepower per pound—is highest in the industry. Less dead weight, plus 8.8:1 compression, means this baby thrives on small-car *regular* gas for extra savings.

And this Fireball V-8 is built to last! The aluminum block has rugged cast iron cylinder sleeves integrally cast with the block. This means long life, faster heat transfer from cylinder walls to the aluminum water jacket. Intake manifold is also aluminum for uniform heating of air-fuel mix. Spark plugs are surrounded by a water jacket for better firing, less fouling, longer service.

You'll find the Buick Special's *ride* matches the magic of its *go.* New Control Arm suspension flattens road bumps and curves. A new Hide-Away drive shaft trims down the tunnel. You have more *room* for heads, hips, legs — *more total room for comfort.*

Ask your Buick dealer for a test drive. You'll be sold on the Special without any sales pitch!

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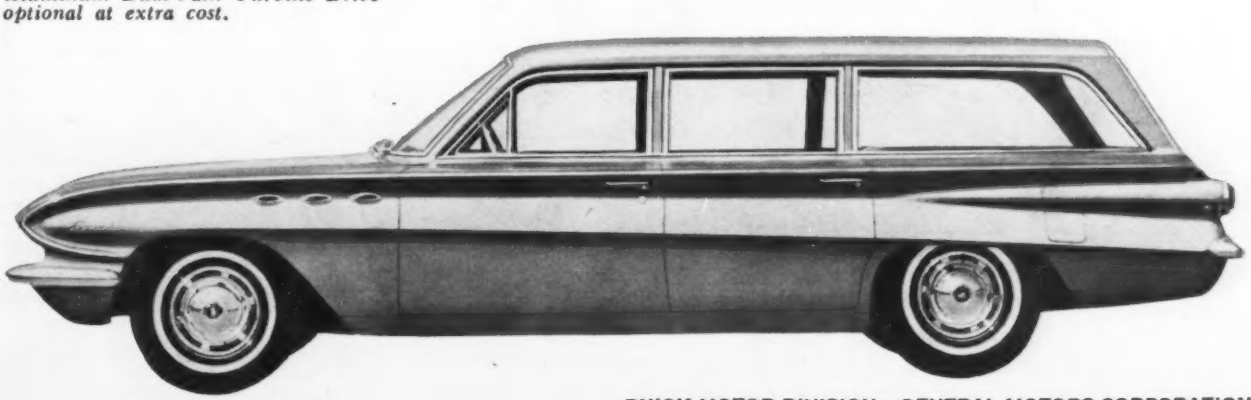

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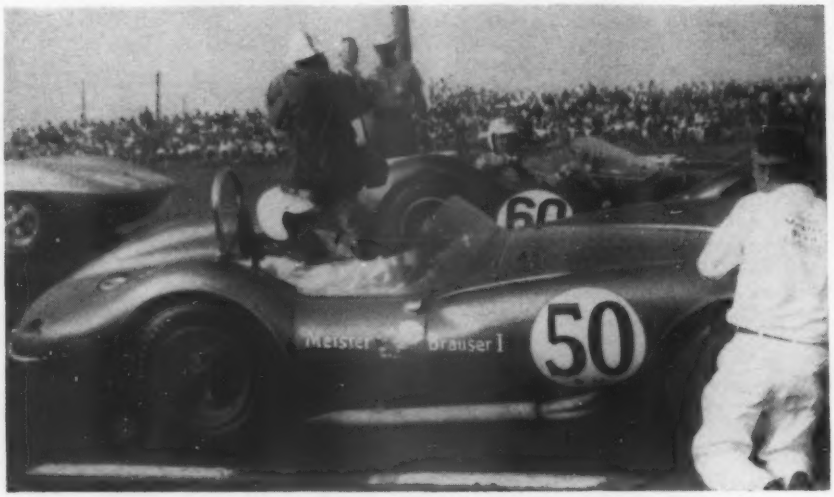

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Top flight competition in the SCCA Circuit, the colorful 1960 Watkins Glen Grand Prix saw the greatest crowd in its history watching world-famed drivers and cars compete. The Scarabs, Lister Jags, Lister Buick, Bird Cage Maserati and the Sting-Ray were there. So were Kendall Motor Oils, official oils at the Grand Prix. Used by a goodly percentage of the 289 entrants, they again proved that **where quality counts, Kendall delivers** — because all Kendall Oils are specially formulated from the cream of Pennsylvania crude to maintain stable viscosity and superior lubrication at high speed operation and high temperatures.

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(Continued from page 6)

New York area who were so generous in volunteering their members and time in our event. Their participation is perhaps of equal interest to you. I was astounded at the response obtained to general announcement that entries would be received from other clubs. At the final lineup of the event, cars were entered from the Northern Chatauqua Sports Car Club of Fredonia, New York; Southtown Motor Club of West Seneca, New York; Volkswagen Club of Western New York; Western New York Region of the Sports Car Club of America; Lockport Sports Car Club of Lockport, New York; Sports Car Club of Rochester, New York; Genesee Valley Auto Sports Car Club of Rochester, New York; Letchworth Sports Car Club of Perry, New York; Seneca Sports Car Club of Seneca Falls, New York and, of course, our own Tonawanda Touring Club.

The Fourth Annual Braille Rally for the New York State School in Batavia will take place in May. Entries will be accepted beginning March 1. We are looking forward to another outstanding event. Thank you for your interest.

E. W. Rideout, M.D.
Batavia, New York

HERALD OWNER COMMENTS

Having become the proud owner of a Triumph Herald convertible on May 29th, I was very happy to see your Road Research Report in the August issue. With over 4000 miles on the Herald I feel that I may now add a few comments.

I drive hard and average a little over 27 mpg. High on a tankful was 31, low was 24 The convertible top's nuts and bolts work loose with annoying regularity, as does the weather stripping around the doors, and it's a very poor seal on the right rear window. The left door pops open now and then (but we have seat belts).

This bomb cost me $2456.75, delivered, including Illinois sales tax and license fees. I wouldn't sell it for $3000, unless I knew where I could get another within an hour.

I have yet to hear an adverse comment regarding the styling. The top, when the bolts stay on, is as easy to work as most sun roofs and the ride and handling are more than satisfactory.

In regards to the note by W. R. Meade III in your August issue — the advantage to buying a foreign sports car over an American car such as a Fury is that while the sports car is burning (let's be honest) 15 — 20 mpg, the Fury is burning fuel at a rate of 8 — 12 mpg. The sports car gets a 10 percent discount on insurance, its license plates are $5-$10 cheaper (in Illinois), it parks in a much smaller area, there is less to go wrong with it and it's a hell of a lot more fun.

Next year the wife gets the Herald and I get a TR-3. When Detroit builds a one- or two-liter roadster, I'll buy American; until then, to hell with the duties, I'll buy imports.

Richard Clarke
Calumet City, Illinois

P.S. I can drive in a circle without touching the curbs, on an average residential street. Can Mr. Meade's Fury?

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* WESTERN STATES SLIGHTLY HIGHER

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Chuck and his Alfa went so fast in 1960 Class E Production races that his car was once "grounded" for inspection.

The verdict: A spotless bill of health! SCCA officials state: "The car is exceptionally well-prepared."

"The outstanding performance of Mr. Stoddard's car," adds SCCA, "is due to this careful preparation and to the superior ability of the driver."

OILZUM ONE OF CHUCK STODDARD'S "SECRET WEAPONS"

Chuck credits Oilzum motor and gear oils with helping him prepare the car that surprised so many people in 1960 races. "My car," says he, "has never experienced a failure. Engine, transmission and differential are all in excellent condition and show very little wear, thanks to Oilzum."

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DETROIT NEWSLETTER

by Roger Huntington

There is big speculation in the industry these days concerning the expected new car Chrysler will bring out to replace the defunct De Soto. Chrysler officials have hinted that there would be a new product line within a year or 18 months, but deny that it would carry the name De Soto. "After all, the De Soto name hardly has much glamour now," they say. Makes sense.

The speculation seems to center around two types of cars: a luxury compact, based on the Lancer-Valiant, to compete in the Buick Special-Olds F-85 class — or possibly a luxury four-place "personal" car along the lines of the Thunderbird. The latter seems a better bet. Prototypes have been seen, some with bodies produced in Europe. It's a cinch this is a fast-expanding new market segment with tremendous potential. Competition would be less vigorous for a company that could jump in within 12 months. (GM is already leaning in this direction too.) Current Chrysler mechanical components could be used; major investment would be production facilities for the body (and frame if unit construction is not used) plus assembly lines. It's doubtful if a car of this type with a European-built specialty body could be delivered in this country for $4500, but with recent progress in fiberglass construction and plastic dies it's not impossible that Chrysler could tool for domestic production and assembly at low volume at a reasonable cost. If Ford can make money on the T'bird operation (and we assume they do), why can't Chrysler?

DIE NOW OR PAY LATER

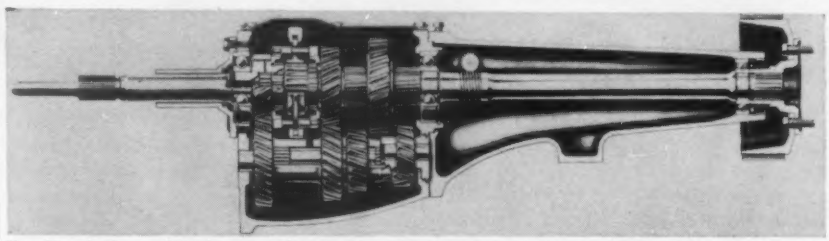
Speaking of De Soto, a lot of people are wondering why they abandoned production only a few weeks after introducing a new model — while the falling market was obvious months before. Edsel did the same thing last year. At first glance it doesn't make sense.

But I think there's a fairly simple explanation. The long "lead time" on most tooling requires that a company commit itself on a new model a year or more before it hits the showrooms. The tooling money for the 1961 De Soto had been spent a long time ago. Meanwhile the rumor started spreading that the line would be dropped. This killed what little market there was left for it. Sales dropped from 42,000 in 1959 to a little over 16,000 1960 models sold this year. Officials hoped against hope that sales would bounce up with new '61 models; since the money had already been spent, they brought them out. It was no use. Orders dropped to the point where it was no longer feasible to assemble the cars or maintain the corporate machinery necessary to keep the name. About the same thing happened in the case of Edsel . . .

SHIFTING SHIFT LEVER

Another trend on domestic products, to floor gearshift levers, is not about to dry up. The feature is offered on two additional 1961 models (Pontiac Tempest and Studebaker Hawk) — and now I hear that Pontiac will soon offer a floor shift for their three-speed synchromesh on the big cars, as well as on the four-speed option. Floor shift is now available on 1961 models of Corvair, Chevrolet, Corvette, Valiant, Lancer, Tempest, Hawk, and Pontiac. A four-speed floor-shift transmission can now be ordered on the Corvette, Corvair, Hawk, and the Chevrolet and Pontiac big cars. Ford and Chrysler are expected to jump on the bandwagon this next spring.

It's a pretty crazy development . . . but it's more evidence of Detroit's catering to the younger buyer who wants more than just transportation in a car. You don't have to be a hot rodder or sports enthusiast to appreciate the direct, positive response of a good shift linkage — and any loss of front seat floor space with the lever on the floor is seldom mentioned as a disadvantage.



New Chrysler heavy-duty three-speed manual transmission will be used in the 300G and Dodge police cars.

Just how far this trend might go is hard to tell now. In the cases of Corvair and Tempest the transmission is in the rear, and the floor linkage is obviously more practical and reliable. Lancer and Valiant got their shifts on the floor through a direct choice. In all other cases the floor shift is tied to a four-speed transmission option — which costs enough extra that sales volume is very low. It will be interesting to see how many buyers of forthcoming manual-shift, three-speed Pontiacs choose the floor linkage. It could surprise us.

BIG WHEELS?

Correct me if I'm wrong . . . but do I detect the seeds of a trend to larger wheels on Detroit products?? Pontiac dropped a minor bombshell when they brought out 15-inch wheels on the Tempest compact, when most of the other compacts use 13-inch. They said it was to increase road clearance and improve handling, but almost everybody at first glance said the cars looked better. (In my own case I saw the new car before I realized it had 15-inch wheels,

was puzzled by the looks—couldn't figure out what was different about it, but only that it looked awfully good.) It's now obvious that a given car can be made to look lower and sleeker by putting larger wheels on it (not just fatter tires). It's not impossible that one inch more wheel diameter could be as effective as a one-inch reduction in overall height.

Will the Detroit stylists be sold? It is significant that 15-inch wheels have now been declared optional on the Buick Special (at $40 extra) and standard size has been raised from 14 to 15 inch on the Chrysler 300-G. Reasons given are ground clearance and brake cooling respectively. But the grapevine has it that styling was the tilting factor, at least in the case of the Buick Special. Also the word is that Olds is considering 15-inchers for the F-85, and Chrysler is said to be looking at 14-inch wheels for some of their compact lines. In all cases the larger wheels would likely be optional equipment for a while because of the higher cost.

This will be an interesting trend to watch.

WARRANTIES

One unexpected problem with the new 12-month, 12,000-mile warranties: some buyers of 1960 models are hollering "foul", storming the dealerships with demands for warranty service on cars they have owned less than 12 months. They don't see any good reason why a 1961 model should be warrantied for 12 months when their similar '60 job should be cut off at 90 days. The dealers are having to play this one by ear—and generally with a few choice opinions directed at the factories for springing this 12-month thing overnight. Many dealers don't like it. Not only do they have 1960 owners on thir necks, but the heavy publicity has caused a lot of buyers of '61 models who don't read the fine print to bring their new cars back for oil changes and chassis lube jobs and routine maintenance that has never been covered by the regular warranty and still isn't. It's caused a lot of friction and hard feelings that won't help the dealers on future sales.

It's a cinch you can't please everybody on everything.

EXPORTED CAR ANYONE?

What do you think of Renault president Dreyfuss's recent appeal to Detroit not to drop "the atomic bomb of the small car" on the European market??? A lot of Detroit observers (myself included, I must admit) have been skeptical about the ability of Detroit to build a small car in the $1500-$2000 bracket that could compete on a value-for-dollar basis with the small imports like the Volkswagen. But here's a man who *should* know who is very much concerned about competition at this price.

I don't know. If some of the car components and tooling were produced in Europe by Big Three subsidiaries—(and that's the way it looks now)—it could be interesting. GM officials have recently said that, pound for pound, they can build cars cheaper in this country than in Germany. A Ford official, when questioned about this, noted that some material costs were higher in Europe and that costs tended to level out more than you might think.

This business never ceases to surprise.
—*RH*

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Top down or open window driving is much more comfortable and pleasant when FCA Wind Wings are installed. Wings are made of pure, first quality Lucite. All metal is brass and triple chrome plated. They'll last the life of your car.

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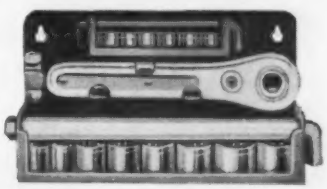
An amazing new tool for tuning multiple carburetor engines. By comparing sound levels of air intake, you can perfectly synchronize carburetors. Far more accurate than other tools and it can be used on any car, any make carburetors. Especially valuable to Alfa Veloce, Porsche Carrera and MB 190SL owners. Comes complete with full instructions for use.

CARB SYNC . . . . . **$7.95** ea., ppd.

19-PIECE METRIC SOCKET SET



Here s a real value for the foreign car owner. A 19-piece, high quality socket set. Made of special analysis select steel, scientifically hardened and fully plated. Comes in specially designed, compact metal case. 15 sockets in sizes 5-19mm, 2 L handles, 6¾" ratchet and screw driver adapter.

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METRIC SET . . . . . **$9.95** set, ppd.

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6 high quality open end wrenches that give the 12 most used metric sizes—8mm to 19mm. Made of engineer type select steel, the wrenches are drop forged and scientifically heat treated. Chrome plated, with polished heads, they'll provide long and useful service.

M941, 6-PIECE
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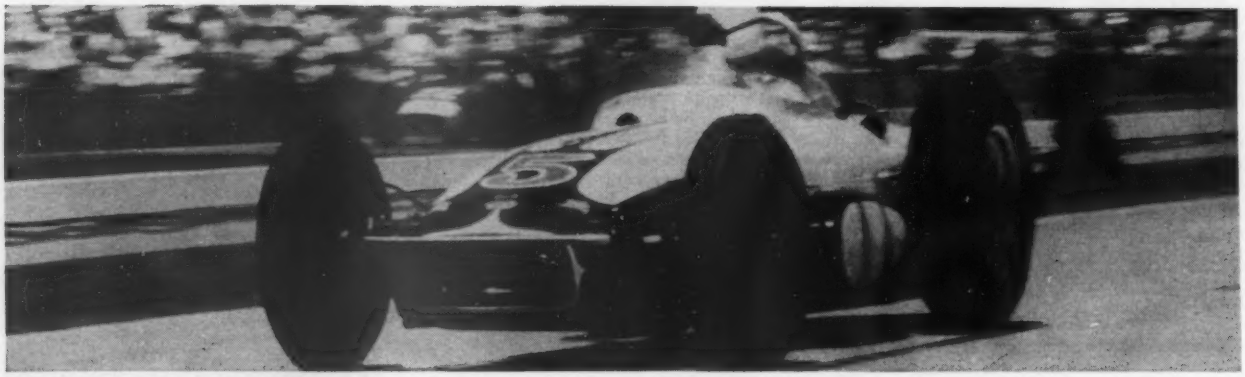
THE RESULTS ARE IN! AGAIN IN 1960.... RACING'S TOP HONORS GO TO OF CHAMPION-SPARKED



USAC 'BIG CAR' CHAMPIONSHIP

The right to paint the coveted number "1" on his car during the 1961 season was won by A. J. Foyt, who captured the crown of the United States Auto Club's 1960 "Championship Trail" with his Champion-equipped Bowes Seal Fast Special.

NASCAR CHAMPIONSHIP

Racing the famous Daytona to Darlington circuit, Rex White slammed his Champion-equipped '60 Chevrolet to 1960's top honors for the National Association for Stock Car Automobile Racing.

USAC STOCK-CAR CHAMPIONSHIP

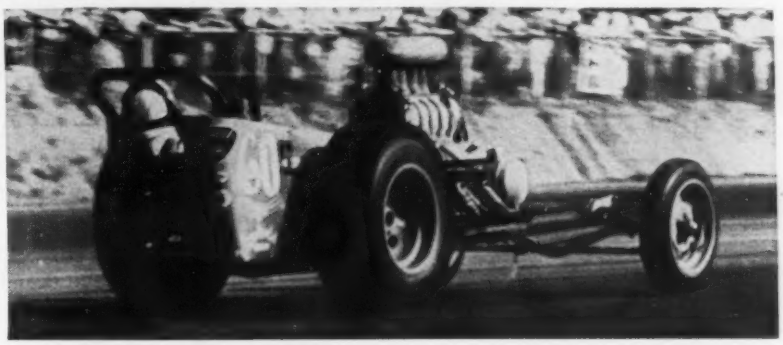
Racing all season in his Champion-sparked Zecol-Lubaid '60 Ford, Norm Nelson piled up wins and points that made him the 1960 champion of the USAC stock car circuit.

DRIVERS CARS!

One of the best ways of judging performance comes at the end of the racing season, when the championships are decided. The outstanding performance of Champion spark plugs is proved again by the fact that virtually all major 1960 racing crowns were won with Champion-equipped engines . . .

SCCA POINT LEADER

Duncan Black, driving his E-Production, Champion-fired Daimler, scored the highest number of championship points in any of the 17 classes in the Sports Car Club of America competition in 1960.



NATIONAL DRAG CHAMPIONSHIPS

The 1960 National Championship Drag Races saw Leonard Harris take the big title—Top Eliminator—with the Champion-fired Albertson Olds. Champions also sparked Middle, Street, and Stock Eliminators . . . plus 25 of 35 competition-class winners.

MARC NEW-CAR CHAMPIONSHIP

The 1960 champion's crown for the New Car Division of the Midwest Association for Race Cars went to Nelson Stacy, who earned his title racing a Champion-equipped 1960 Ford.

Here's further evidence to prove that every engine does its best with Champion spark plugs. Whether you're interested in setting up a car for competition, or just in securing top all-round performance from your family car, be sure to pick the plugs the winners use—Champion spark plugs!

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SPARK PLUGS

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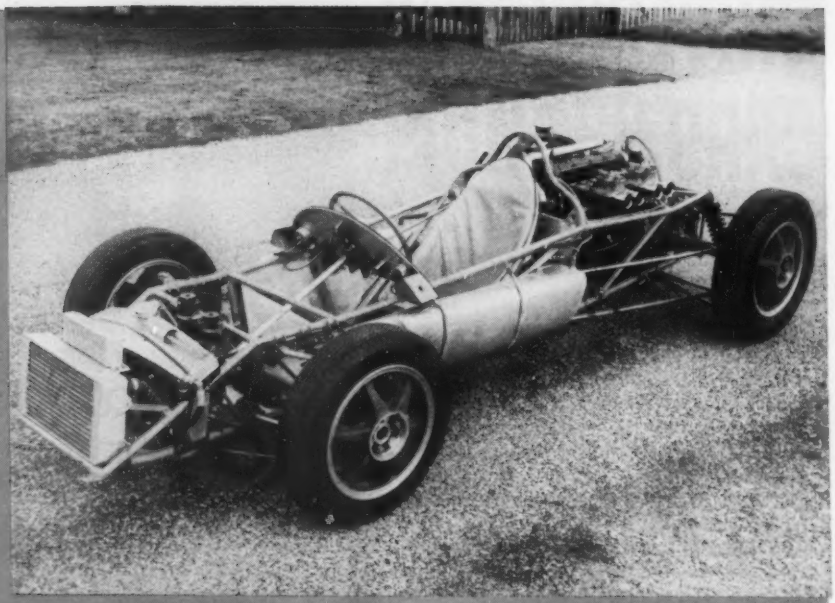
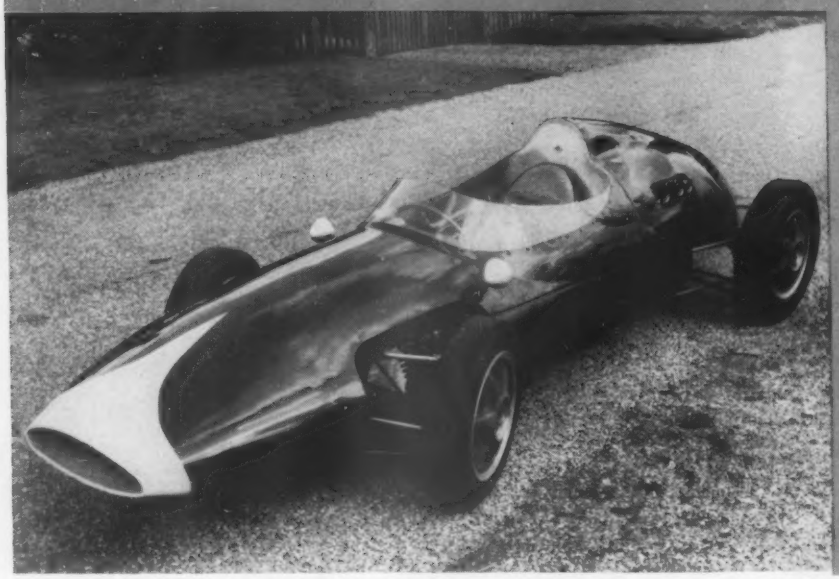
The EMERYSON

by Dennis May

Paul Emery, experienced British designer-builder, puts a versatile cat among the Cooper-Lotus pigeons.



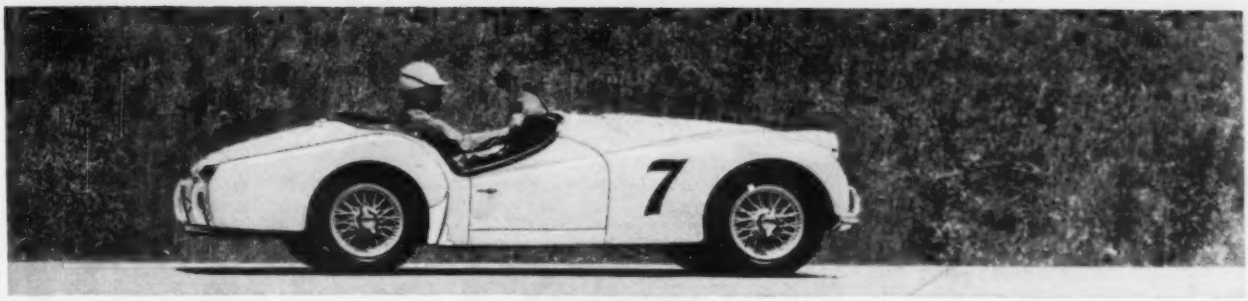


An inch or two shorter than the Lotus, the F.1 Emeryson has an 86-inch wheelbase, 48-inch tread and is made from 1- and 1.25-inch frame tubes. Front and rear suspensions have coil spring-shock absorber units. The front suspension is a la Cooper and Lotus while the rear resembles Lotus but is pure Emeryson. The Coventry-Climax engine is tilted 20 degrees and, with side and "lap type" fuel tanks (39 gallons), the car has 50-50 balance. Disc brakes are used on all four magnesium wheels and the car weighs 834 pounds dry. It has rack and pinion steering. At the rear of the chassis, which is virtually identical in F. Jr. form, is the 5-speed Colotti unit with built-in differential and clutch. Juniors (802 pounds dry) use Ford or Fiat engines and drum brakes.

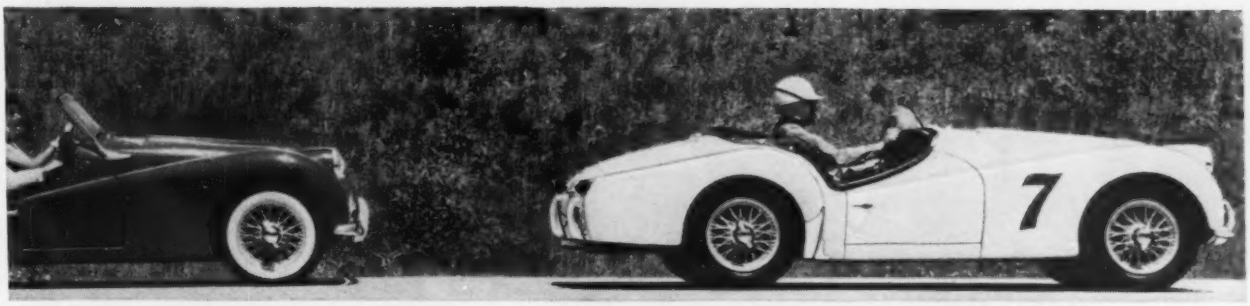
► Within two weeks of the announcement of Aston Martin's retirement from G.P. racing, the gap in British ranks was plugged by a new F.1 contender – the Emeryson. If the name's familiar, it's because Paul Emery has been designing and building racing cars for nearly 15 years. But this is the first time he's lent his name and talents to a venture with a scope and aspirations roughly comparable to Cooper's and Lotus's. Earlier Emerysons, starting with a d.o.h.c. Lagonda Rapier engine in Emery's own de Dion-reared chassis in 1946, the first two-stage-blown car built in Britain, were mostly one-off-ers. Among them was one built around an eight-carb Duesenberg straight-eight, to fit the old F.1 that lapsed at the end of 1953. The first of the latest Emerysons, launched during the 2½-liter Formula's twilight, were built around 2495 cc Coventry Climax FPF engines, as pictured, or, for Formula Junior, the Ford 105E powerplant. Other Junior features include use of lighter-gauge steel for the frame, a decreased fuel capacity, an engine option, the Fiat 1100, drum brakes, and the Renault 4-speed transmission.

The prototype F.1 was track-tested by Graham Hill, Masten Gregory, Jack Fairman and Ron Flockhart, among other notables, and was pronounced brilliantly raceworthy. It was to have early tryouts in 2½-liter form in some end-of-the-season British events, driven by Flockhart. While it was planned to apply any lessons learned in the trials to development of the 1½-liter cars, the firm hopes few changes will be needed.

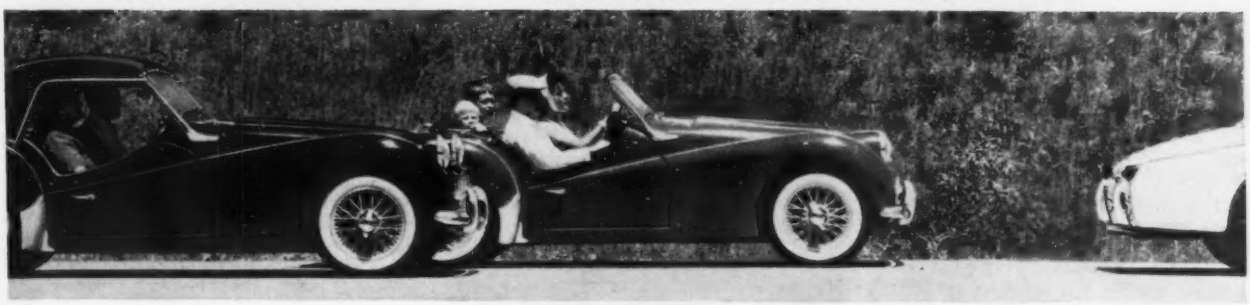
Emergence of this virtually new make, incidentally, puts the name of Send back on the racing map. It was the home of Connaught Cars, and the non-racing successor company still operates there. Alan Brown, managing director of Emeryson, forms a link between the two firms since he also serves as joint managing director for Connaught. No stranger to racing, he once held the Goodwood F.3 lap record and won the sports car British Empire Trophy in 1954. The entrance of an all-new car as an all-new Formula gets underway is an exciting prospect. We will watch with interest the Emeryson bid for wins in its first season. —*DM*



NOTICE



NOTICE WHO'S DRIVING



NOTICE WHO'S DRIVING TR-3's

It's not surprising that you see so many TR-3's these days. There are more than 50,000 of them on the road. What may surprise you is the kind of people who drive them. Take a look next time you're out.

Along with the drivers who like to win races and rallies, you'll see housewives with shopping bags and retired businessmen with golf bags. You'll see doctors on calls, families on vacation.

And you'll see that all these people have something wonderful in common—they're having fun! The TR-3 gets you from place to place as well as any car (more quickly and more safely than most, as a matter of fact). It gives you up to 35 m.p.g. And it costs you quite a bit less* than a "low-price-three" convertible. But most of all, it's fun!

That's the real magic of the TR-3 that owners talk about.

Whether you enjoy racing or not, it's fun to go from 0 to 50 in 8 seconds, to be able to go 110 m.p.h. if you want to. It's fun to shift through 4 speeds forward, and go in and out of hard curves without swaying. It's fun to stop with the sureness of disc brakes.

Even the deep-throated growl of the engine is fun.

There are dealers in every state—over 650 in all—with complete service facilities. Call the one near you today. He's in the Yellow Pages. He has a full range of models and will bring one to your home for a free demonstration.

ANOTHER GOOD IDEA is to take a look at the new TRIUMPH/Herald, with engineering advances found on no other cars—import or compact—and priced to make it ever so easy for you to become a 2-TRIUMPH family. Choose from 3 models—Sedan, Sports Coupe and Convertible. **TRIUMPH**

***Convertible—$2675, Grand Touring** (with detachable steel hard top)—**$2835.** Port of Entry, plus state and/or local taxes—slightly higher in West. Overseas delivery available. Standard-Triumph Motor Co., Inc., Dept. F-31, 1745 Broadway, New York 19, New York.

PIPELINE

In an earlier Pipeline, we mentioned the quest for the nation's **"outstanding safe driver,"** a contest sponsored jointly by Du Pont Chemicals, Columbia University, the National Safety Council and the Dodge Division of the Chrysler Corporation. It's

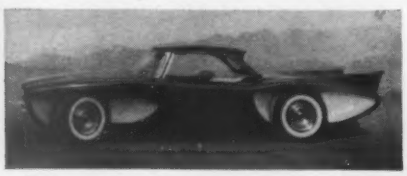
been settled, and a Minnesota Highway Patrolman, Alex J. Keilen, 52, above, right, was adjudged the winner after extensive psychological and driving testing. He was selected from among six semi-finalists (who in turn were chosen from among 5000 Safety Council 20-year-award winners) and edged out 58-year old Charles J. Espich, above, left, of Fort Wayne, Indiana in a three-day drive-off. Ptl. Keilen won a '61 Lancer for his efforts, which included testing of Telar anti-freeze—summer coolant.

Preliminary evaluation of data compiled in the hunt revealed characteristics of the "typical" safe driver: He is about 57, has been driving professionally for 32 years; has held the same job for 30 years. He's completed at least two years of high school and has never had a traffic violation in his driving career. Last year he drove about 18,000 miles on the job and another 8000 in personal driving. Less than 20 percent of his professional driving is after dark though almost one-third of his personal motoring is done at night. He probably drives a truck and has won a Safety Council safe driving award at least 23 of his 32 years on the job. Dr. James L. Malfetti, executive director of Columbia's safety research project, said of safe drivers, "Their driving is well planned and they know exactly what they are going to do if various situations come up." Not bad advice. . . .

Work has begun on Volkswagen's new American headquarters at Englewood Cliffs, New Jersey. The structure, on a 18-acre site, will be finished October 1 and will have cost $2.5 million. . . .

The increasing number of sports cars in the Philadelphia area has prompted **WCAU** to create a special music and news program for foreign car aficionados. The show is "piloted" by Dick Covington, the station's music programmer and a sports car buff himself (he drives a TR-3). Heard every Saturday from 6:15 p.m. through midnight, Covington includes reports on area club activities and comments on items in SCI. . . .

While aluminum is stealing most of the '61 new car headlines, the Dow Chemical Co. is quick to point out another light metal, **magnesium, will see increased use** in the future. One of its applications this year is in the Dodge Lancer instrument cluster. But magnesium is not new at Chrysler. It's been used since 1950 for steering post housings and is the optional material in torque converter and transmission housings. . . .



Seekers after the unusual may find the Savage Sports Car Manufacturing Company's fiberglass body right down their alley. Weighing only 175 pounds, it's said to fit about 35 stock American chassis. The body sells for $445 and is available with a removable hardtop for $99 more. Inquiries should be sent to Savage Sports Car Manufacturing, Dept. S, 316 South Mariposa, Los Angeles 5, California. . . .

Music maestro . . . **45-rpm records can be played in your car,** and only one hand is needed to operate the machine. The Norelco "Auto Mignon" is the unit. Records are pushed into a slot and from there on it's automatic. After playing, the record slides out almost like bread from a toaster. Priced at $57.50, it's available from High Fidelity Products, Dept. S, 230 Duffy Avenue, Hicksville, New York. . . .

Count Johnny Lurani, the father of the Formula Junior, was a friend of the Flying Mantuan. And in his book, succinctly titled "Nuvolari," he presents the facts surrounding his meteoric career. He notes, for example, how the young Nuvolari was torn between automobiles and airplanes and how he built a plane and later tried to fly it. It crashed and the pilot was injured.

All the major exploits of Nuvolari's life are faithfully recorded. If there is a deficiency, it is perhaps that Lurani dwells too little on the man and too much on the exploits. The book is not so much a study in depth of the small, tough Champion of Italy as a recounting of his triumphs and near-disasters. Lurani, in retelling Nuvolari's story, offers clues to the kind of man he must have been, but treats the man as secondary to what he accomplished. Still, the exploits read like good fiction. There are parts that may strongly remind the reader of Hans Ruesch's book, "The Racer," only here there are Alfa Romeos, not "Milanos," and here is Nuvolari, Il Maestro, not a product of a writer's imagination. Lurani, in offering a chronicle of Nuvolari's life includes passages that shed light on some of the other stars of racing's great day, before World War II. "Nuvolari," the writing of which was assisted by Luigi Marinatto, was translated from the Italian by John Eason Gibson. It has numerous photos and costs $5.00. It's published by William Morrow & Co., New York, and has 223 pages. *—HW.*

If you've been inflicted with kart fever and want to squeeze the last drop of performance from your **West Bend-powered bolide,** Go-Power Corp., Dept. S, Box 613, Palo Alto, California, offers a $2 book with tips on carburetion, polishing, tuning and the like. Succinctly, it's titled "How To Hop Up Your West Bend."

Gunnar Andersson drove the **winning Volvo,** PV 544, one of five in the top eight places, in the 1960 Argentine Gran Premio Internacional Standard at an average of 71.96 mph over a 2,873-mile course. Other Volvo wins last year included the German Rally and the Scandinavian Mobil Economy Runs.

Relatively expensive, but guaranteed "to clean your car; give it a clear, streak-free, hard, deep, jewel-like custom finish in half the time you've experienced or your money back." It's **Classic Car Wax,** available from Jay's Sports Car Accessories, Dept. S, 6055½ Melrose Ave., Hollywood 38, California. Priced at $3.50, the kit includes a half-pound can of wax, applicator cloth and plastic case. . . .

We received a letter recently from **Roy C. Ames** of Beaumont, Texas about his experience with a modern, high-performance domestic car. We think he states its, and his, case very well:

(Continued on page 18)

MOTORING SPECIALITIES for CAR and DRIVER

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"THE CHAMPIONS' CHOICE"

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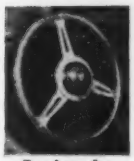
Racing Steering Wheel



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and most leading drivers. Only ⅓ weight of standard wheel with boss to fit column and accommodates present switch assembly. Available for AH, Jaguar, MG-A, TC, TD-TF, TR, AC, Corvette, Porsche, Aston-Martin, Morgan, Sprite, Alfa-Romeo (1300 only). Made in England of Duralumin one-piece frame with contrasting laminations of light African Obechi wood and rich dark Mahogany. Hand French polished, finger serrations on the underside to ensure a firm grip. The smaller (16" dia.) wheel allows ease of handling. (Corvette 17" dia.)

State make, year, model of car.

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Driving to work or play, you'll place these imported Italian Sala-Sport gloves with the exclusive non-slip grip among your choicest possessions. Skin-soft, well ventilated Italian leather, double leather palms. Select from four distinctive styles (except Shorties — $7.50) in all sizes. Your choice of all black, tan and natural brown, white leatherback and tan palm; knit back and brown palm. Shorties in knit back and brown palm only. Sizes: 6½-10 inclusive for ladies and gentlemen.

$7.95 ppd.

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RACING & DRIVING SUITS

Designed in Italy with the sports car and racing enthusiast in mind, these original racing suits are colorful, comfortable and distinctive.

ONE-PIECE SUIT **$15.95 ppd.**

A European and American favorite for races and rallies. Features include elastic gathered wrists, waists and ankles; mandarin collar, roomy pockets with heavy duty zippers. Available in white, grey, French Racing Blue, Red or Black. Tailored washable poplin fabric in men's sizes only (36-38-40-42-44).

TWO-PIECE **RACING SUIT** (Pants $7.95 Jacket $9.95) **$16.95 ppd.**

FLAME PROOFING $1.50 per pkg. (add 25¢ postage). Flame proof your cotton, silk, linen or wool suit with "Official Flame-Proof Chemical's" No. 55. Spray or dip. Carries State Fire Marshal's approval.

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"RAYDYOT" **RACE MIRRORS**

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FIA APPROVED BRITISH MADE

Used as original equipment by the leading racing car manufacturers including Aston-Martin, Cooper, Lotus, Vanwall, etc. Shatterproof mirror in your choice of flat or convex glass mounted in streamlined spun aluminum cone housing. Wt. 5¾ oz. Adjustable base with positive locking device. Recommended for cowl mounting.

$5.95 ea. ppd.

Universal Fender Mirrors

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Without a doubt, these are the best all-round fender mirrors available today. Universal fitting allows use on either left or right fender. Streamlined pillar and foot. Heavily chrome plated on brass. Choice of convex or flat mirror glass.

Fender Mirrors

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This ingenious British made fender mirror contains a torsion element and springs back to your preferred setting if accidentally brushed by a passerby while car is standing. Universal fitting allows use on either left or right fender. Heavily chromed on brass. Your choice of flat or convex mirror glass.

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"Shorty" with visor $36.50 ppd., less visor $35.00 ppd.
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Specify Smoke or Clear Lenses

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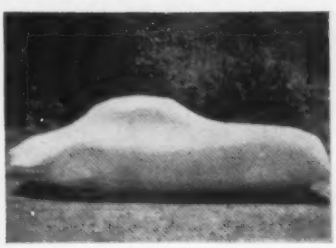

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1. Can you name this type of drive, recently introduced in America?

2. Not "sports car," but sport—what kind of race is being held here?

3. What is the name of this famous racing oval?

4. What does this symbol stand for?

THE symbol stands for the complete engine protection you get with Quaker State Motor Oil. Super refined from 100% Pennsylvania Grade Crude Oil, Quaker State keeps your car on the road, out of the repair shop. Insist on Quaker State—available most everywhere. For the name of your nearest dealer, call Western Union and ask for Operator 25.

Answers: 1. Transaxle (illustrated: 1961 Pontiac Tempest). 2. It's a Drag Race. 3. Indianapolis Speedway. 4. The world's finest motor oil.

Get your free copy of the new technical bulletin on British and European sports cars and passenger cars, prepared by Quaker State's Research Laboratories. Send us your name and address, and ask for Bulletin P-952B-13.

QUAKER STATE OIL REFINING CORPORATION, OIL CITY, PENNSYLVANIA

(Continued from page 16)

I feel SCI has overlooked many cars for road testing that are every bit as exciting to own and drive as the Jaguar 3.8 tested in September. These are some of the American models such as the '60 Pontiac Bonneville Sport Coupe I own. After having owned nine imported cars in the past five years and driven almost every kind and type (I was in the imported car business for several years), I feel I am qualified to say my car is every bit as exciting, comfortable, responsive, fast, safe, luxurious and economical as, say, the 3.8.

Here's a rundown of the factory-installed "special options" my car has: 348 bhp "425A Tempest" tri-power engine; four-speed all-synchro transmission; heavy duty clutch; limited slip 4.11 to one rear end; aluminum finned brakes, hubs and wheels; export suspension; oversize Firestone tires; heavy-duty oil cooler and

radiator; dual exhausts; leather-covered foam-rubber bucket seats and miscellaneous items including rear seat speaker, tinted glass, two-speed electric wipers and washer, air conditioning, heater and defroster, back-up lights and push-button radio. The car listed for slightly under $5300, compared to the 3.8 at $4800 without air conditioning. Of course, anyone can get a substantial discount on an American car, especially without a trade-in.

In regard to performance, there is no one rpm range where the engine performs best; just press the accelerator at any speed and the car jumps. I have run it 0 to 60 in 7½ seconds in first gear; it will go about 90 in second, about 115 in third and I don't know what in fourth. These are speedometer readings, not corrected. The transmission (Corvette) is the finest to handle I've ever seen. The HD clutch does not slip, though its action is smooth. The car is as fierce as a wild bobcat on demand, but is also as docile as a little old lady in a Cadillac Fleetwood when desired.

The car handles as well as an MGA and better, I think, than a 3.8. The rear end stays put, there's no choppiness, judder or wheel hop and there's no tire squeal. The steering, like the brakes, has no power assist, yet it's accurate as the Jaguar and doesn't have that heavy feel at low speeds.

Gasoline mileage is about 13½ mpg. While not as good as the Jag's 20 mpg, parts are cheaper and the overall maintenance figure should be less. As long as the accelerator isn't pressed to the floor, the car runs on a small two-barrel carb with the other two large carbs working as the pedal is depressed. *SCI*

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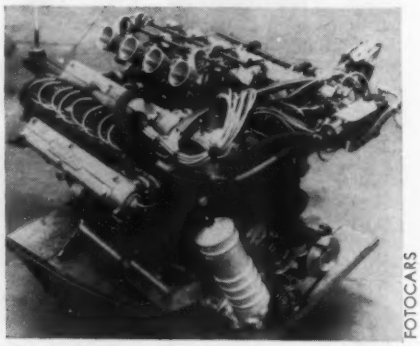
EUROPEAN NEWSLETTER

COLTRIN

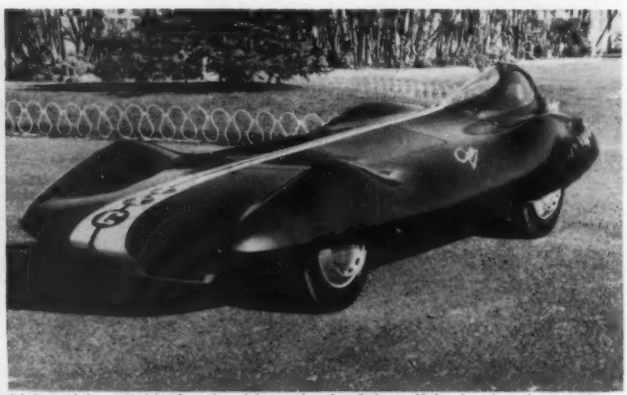
Von Trips tests a V12 Testa Rossa-engined single-seater meant for Free Formula races in New Zealand.

Pininfarina's latest expression of mobile sculpture is draped on the equally exciting chassis of a Ferrari 400 Superamerica. It is a first attempt by the two firms to produce a low-drag body shape.



FOTOCARS

This is a completed example of the newest Maserati V8 engine detailed on pages 58 and 59.



Two experimental designs from Ghia display a wide divergence of opinion on which end is suitable for the driver. In the Selene II he is placed centrally in the nose with two rearward-facing passengers in back of him. In the IXG record machine, styled after an American sling-shot dragster, he sits astern.

A beautifully simple body by Bertone on an Alfa Romeo 2000 Sprint chassis manages to use dual headlights without submerging the Alfa grille.

Here's another body by Bertone, this time a Spider design on a Sport Prinz chassis. This is a first try at a convertible for the NSU.

FERRARI FOR DOWN UNDER

Bound for New Zealand, where it will compete in Free Formula races, a three-liter Ferrari *monoposto* was under test recently at Modena in the hands of Wolfgang Von Trips. Built for the New Zealand Ferrari agent, the car has a V12 Testa Rossa engine mated to the normal G.P. five-speed transmission-differential unit. Von Trips, after a stint behind the wheel, commented "Now there's a *real* race car!" Bystanders said its noise and obviously fierce acceleration did nothing to belie that description.

Meanwhile, Ferrari is continuing its construction of rear-engined chassis. Three were in various stages of development at this writing and there is a fuel injection manifold being tested for the V6 Dino.

Though the number of seats on full-scale racing teams is few, Von Trips apparently turned down an offer from Porsche to sign with Ferrari. According to Trips, Phil Hill and Ginther will be at the wheels of Ferraris in '61 also. One reason offered for Trips's accepting the Italian bid is his interest in building Formula Juniors (viz., the TCA) at Modena.

DISC BRAKES FOR MERCEDES

From January on, all Mercedes 300SLs were fitted with disc brakes and coming out at the 1961 Geneva salon will be a 220SE coupe featuring discs on the front. The new coupe is somewhat lower but basically the same size overall as the 2-liter sedan. It's rumored in Stuttgart that the 3-liter fuel injection engine will also be available in the coupe version.

EUROPEAN TRAFFIC JAM

It's fantastic how a small patch of fog can disrupt traffic on the German Autobahn. Over a short stretch of four-lane road that's become famous for its super-high accident rate, there was a recent colossal pile-up due primarily to fog. Our European Editor was traveling in the opposite direction and the lifting fog revealed a chain accident that had repercussions for seven miles back.

Trucks and semi-trailers jack-knifed, a Volkswagen wrapped in a ball—ten cars in a row completely welded together in one long angry snake—drivers out, mostly standing around in a bewildered way as traffic backed up literally for miles, completely blocking access for police and emergency vehicles. Such situations, however, are bound to get much worse before getting any better as Autobahn construction continues to lag. Yet, two-lane roads continue to be built in place of an absolute minimum of three.

The Continental traffic situation varies from country to country with Germany and England undoubtedly in the worst fix. Italy only recently finished the spectacular Bologna—Florence stretch of its Autostrada del Sole. It's now possible to drive from Milan to Florence in less than three hours, previously a five-hour trip, part of which led over the Mille Miglia route.

Time-saving as they are, it's sad that these new "miracle" super highways eliminate many interesting stretches of road.

After an opening-day traffic jam, things returned to normal on the Autostrada as Ferrari and Maserati drivers discovered some of the curves could be taken at 125 mph in complete (?) safety.

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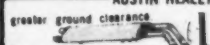

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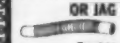

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TECHNOTES

BLOWN GASKET

I have a 1954 Opel Rekord and it has a blown head gasket. Can you tell me where I might get an engine gasket set?

Leland Wilder
University of N. H.
Durham, New Hampshire

If your local Buick service is unable to help you (they didn't start selling Opels until about 1958), your best bet is to try Columbia Motor Corporation, 419 East 110th Street, New York 29, N. Y. They are a veritable home for automotive orphans.

VALVE ADJUSTING

Joe Petrovec makes quite clear the valve job on the four cylinder engine. But what is the valve adjusting sequence for a six, such as the Austin-Healey?

Dominic Salvatore
Detroit, Mich.

The scheme described in the December issue is especially suited to BMC engines and ones like them where valve clearance is measured against the cam flank rather than the heel.

One way to keep track is to use the magic number system. For fours, the magic number is 9, for sixes it is 13 and for straight-eights, it is 17 (twice the number of cylinders plus one. You can count from either end of the engine and adjust rocker R when valve V is fully open, just remembering that R plus V equals the magic number. Magic?!)

Another scheme is to number the valves starting at one end and the rockers starting at the other end. Then you can adjust rocker number 3 when valve number 3 is open. But don't get the two systems confused, for heaven's sake. Unlike torquing the head, the actual sequence in which you adjust the rocker clearances is unimportant.

ZWISCHENGASGEBEND

I have just had a discussion with my local VW dealer which leaves me puzzled. I double-clutch my VW when down-shifting. The dealer claims this is bad for the clutch and transmission. Aside from the fact that double-clutching uses more clutch strokes, I cannot see how this can harm anything. I don't see how proper double-clutching can do anything but save wear on the synchromesh mechanism as it brings the meshing gears and collars up to the same rpm prior to meshing. The dealer claims that the VW factory-trained instructors emphasized over and over again that the deluxe model is not to be double-clutched.

Vot gives?

Richard E. Reeder
Baton Rouge, Louisiana

Double-clutching (known as double-declutching among the tweedy set and as above in Germany) is fun. Your local VW

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(Continued from page 22)

dealer may be friendly but he's off his rocker on this point. You have analyzed the situation quite accurately, but perhaps your dealer is reluctant to specify the one detail you've left out, namely the horrible noise and accompanying damage when you miss a double-clutched down-shift into first.

BONNEVILLE RULES — TOO STIFF?

"Salt, Speed and Safety" in your December issue was quite enlightening, especially the times for the sports car classes. I own a stock 1959 Alfa Super Spider which is no better than average. The Alfa Romeo factory claims a top of 118 mph for this car in touring trim. Mine has indicated 125 with the top up in competition, so it seems to me a bored-out Alfa like Mr. Jacobowitz's should do better than 114, even allowing for plenty of speedo error in my car.

Are the rules at Bonneville set up to restrict the potential of a car or am I just too optimistic?

Peter Weisberg
Scarsdale, N. Y.

One of the major handicaps about running at Bonneville is its altitude of 4200 feet above sea level. This not only requires lengthy, on-the-spot tuning due to the lower density of the air, but by the same token reduces the power available, no matter how correct the tuning. In effect, the thin air "de-charges" your engine, which explains why superchargers are so popular there.

The rules definitely do not restrict the potential speed of any car. However, since not everyone is a Mickey Thompson, the rules provide several categories by type of car (lakester, streamliner, and three types of sports cars, touring, GT and racing) so that everyone may compete on reasonably equal terms. Naturally the rules have to draw lines somewhere and anyone who's trying really hard in one class will sooner or later bump up against the line that separates him from the next class, be it a displacement limit or a rule about windshields.

A point worth keeping in mind is this: competition at Bonneville is still pretty spotty; witness the 77-mph prize-winning, modified VW. Sure, lots of hot VWs can beat that speed, but the point is they weren't there to prove it. Now, if you think your Alfa can beat 114 mph at 4200 feet, why don't you write off for an entry form and rules for the 1961 Bonneville meet?

SILENCING VALVES

I did a valve job on my MG TD which closely followed your articles (November and December). I had two purposes in mind: to quiet the engine and remove the carbon accumulated after 26,000 miles.

I neglected to buy the small O-rings that go under the split retainers on the valve stems. I reassembled the engine without them since the old ones were worn beyond use. Can I expect excessive oil consumption from this?

I did not succeed in lessening the valve noise and it's still most prominent at 2500 to 3000 rpm. Can you suggest a cure for this noise or is this a must on the TD with a valve clearance of .019?

John Dellis, Jr.
Abingdon, Virginia

The O-rings are to discourage oil from

dripping down the valve stems. They come into significance only when the valve guides become worn. If it's possible to wiggle the valves in the guides when the springs are off, the guides are worn.

Late model TDs had different cams which required only .012-in. valve clearance. Guess why. Since changing cams to quiet the engine is rather extravagant, try this measure: if the rocker arms wiggle on the rocker arm shaft, rebush them. They are often the unsuspected culprits.

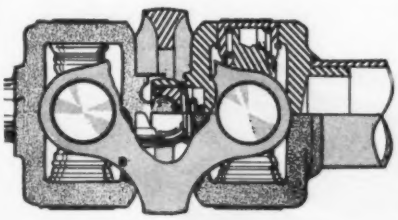
CONSTANT-VELOCITY JOINTS

In the December issue, Roger Huntington mentions the constant-velocity universal joint. He says it is two Cardan-type joints set back to back, with a yoke and ball-joint assembly in between.

Very nice, but what does it all look like? Did he run out of film or break his drawing pencil?

A visit to Buick and Olds salesrooms gets only a not-too-polite brushoff when asking technical questions. They are interested in sales and sales only. Anything else and you are given a disgusted look and told to go to the rear and see a mechanic. And the mechanics say they don't know what a c.v. joint looks like because they are too new.

H. A. Rollins
San Antonio, Texas



Here, via inside channels from a sheet marked "Not for Release", is what you're looking for. How does it work? As you may know, one-piece shafts usually have their two U-joints "in phase" with one another, that is, so the fixed yokes at each end of the shaft are parallel. The oscillatory motion put in at one end is taken out at the other (assuming the angles are equal at both ends). The c.v. joint used by Buick and Olds can be thought of as a super-short piece of driveshaft, one whose own vibrations won't be noticed in the car because it's so small and light. The ball-joint is used to locate the assembly by keeping the two real driveshafts pointing at each other. Of course, the forward shaft is mounted in a ball bearing just ahead of the c.v. joint which is attached to the frame. Also there is a splined slip joint.

CORRECTION!

In our January article on camshafts, we made a most unfortunate error. On page 64 at the end of the third paragraph, the words open and close should have been transposed. The sentence reads correctly, "Overlap is measured by combining the two figures: intake open, exhaust close (again, the Twin Cam: 40° overlap)."

Overlap is the period near Top Dead Center when both valves are open. It is measured in crankshaft degrees, as is the valve timing. It ranges from a mild 5° on a Volkswagen to a staggering 90° on a Mercedes-Benz 300SL.

Two Fantastic new L.P. Recordings

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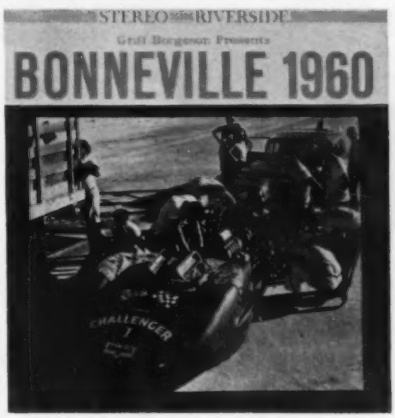
RLP 5020 (mono) XK 8003 (stereo)

This exciting new recording contains only six minutes of sound, but without any question this is the most extraordinary sound ever put into the grooves of a phonograph record. In October of last year we flew to Stuttgart, Germany via Lufthansa and recorded all the cars in the Mercedes-Benz museum. There are dozens, and all the racing cars were taken out onto the test track and driven at speed by Karl Kling. They were recorded in all their uproarious sounds, and then through the miracle of modern electronic engineering, a race that never took place was created in which these seven cars (2 W125's, 1 W163, 1 W165, 2 W196's, and a 300 SLR) approach the starting grid, line up, rev, and then excitingly start. This is followed by lap on lap of tremendous racing sounds, shifting, braking for pit stops, and finally the finish of this special six minute classic. These cars have the most fantastic sounds ever produced by racing cars, and in fact, when we mastered our recordings two loudspeakers split in our studios as a result of the volume. These cars, of course, are the very ones driven by Fangio, Lang, Fagioli, Seaman, Caracciola, Von Brauchitsch, Moss, Collins, etc. $1.00 per minute may sound expensive, but these sounds are well worth the money. You high fidelity buffs will get a charge out of the stereo version because it is pressed on a very special new material which brings incredibly high responses (polymax), and the record starts at the centre and runs out in order to relieve centrifugal pressures on the grooves.

sounds on the salt flats....



RLP 5506 (mono) 95506 (stereo)

Griff Borgeson, contributing editor of Sports Cars Illustrated, has put together a remarkable record of the sounds emanating from the land speed record attempts this summer on the salt flats of Utah. Bonneville is the home of the Mickey Thompsons with their four-engined cars, as well as the people who like to put saddles on airplane jets and call them cars. In any case, every outlandish and wildly imaginative automotive device was out there this year shooting at the mark, and Griff and RIVERSIDE bring to you the beautiful noises they made. Included are such classic entries as the Brissette Brother 264 mph bell tank lakester, Dr. Ostich in his 267 mph Flying Caduceus, Art Arfons's Allison turbocharged, airplane-engined special, Bob Bowens' Shadoff Special at 273 mph, and last but not least, Mickey Thompson running at 406 mph.

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This is no ordinary Lancer. This one has a Charger 225 engine under the hood. Displacement: 225 cubes. Horsepower: an honest 145 at 4000 revs. Torque: 215 foot pounds at 2800 rpm.

How do you get this kind of power from 225 cubic inches? Design the engine so it can breathe! Give it big intakes and exhausts. The block on the Charger 225 engine is inclined 30° to the right. Makes room for the manifolding. The fuel and air charge is fed to each cylinder individually. No siamesing here. The big exhaust manifold—with large radius curves—lets gases leave with minimum back pressure and power loss.

The real sizzle comes when you hang this Charger in a car weighing under 2700 pounds. That's Lancer. A car with a taut suspension system. Torsion bars up front, assymetrical leaf springs at the rear. No mushiness. Yet no hard shocks, either. Level cornering. Check it out yourself: Lancer with the Charger 225 engine. Available on all Lancer models. Your DODGE dealer has it. See him real soon.

SPORTS CARS ILLUSTRATED
MARCH 1961

This year our industry moved strongly in two ways: slashing maintenance and stretching warranties. Are these moves related? Are they of real value to the car buyer? These and other key questions are answered frankly by Detroit Correspondent Roger Huntington.

► For 20 years automotive dreamers — the guys who always see the ultimate conclusion of every technical trend — have been talking about the "no-maintenance" car. This hypothetical car would supposedly function satisfactorily from one to five years with no more attention from the owner than addition of fuel. Impossible, of course. That's what the more practical engineers say. But several bombshell developments in the 1961 model crop suggest we might at least have the right to *dream* about a no-maintenance car. Ford Motor Company electrified the industry by announcing a 12-month, 12,000-mile warranty on new '61 cars — with a recommended 30,000-mile chassis lubrication interval. Cadillac went them one better by announcing a chassis that required *no* additional lubrication. Then Lincoln countered with a 24-month, 24,000-mile warranty.

American auto enthusiasts are at a loss to know just how to put these developments in their proper perspective. Are these really *important* developments, or just more ballyhoo? How will they affect the design of future cars? What will it mean to the car owner? How is the warranty related to maintenance?

Actually the lubrication requirements of friction points in a car's suspension, steering, U-joints, etc. are not nearly so critical as in the engine and transmission. Working loads per square inch of contact area may be high, but rubbing velocities are always very low, so a constant flow of fresh oil is not necessary. In this situation a coating of grease in the rubbing area will do the job. Grease is nothing more than conventional, relatively-thin lubricating oil (either mineral or synthetic) that is thickened with a soap, generally based on lime or sodas and a fat. The thickening makes the oil adhere to the rubbing surface and keeps it from draining out when it heats up. In some chassis areas it's not even necessary to use grease. In low-load areas rubber or plastic bushings may do the job.

This brings us to the problem of *eliminating* periodic chassis lubrication. Obviously the simplest answer would be to use the rubber or plastic bushings mentioned above, which require no lubrication at all. This is a very promising field for development today. Rubber is well suited to applications where loads are relatively light, especially the newer synthetic compounds that resist attack by road salt, weather, and time. Most cars now use rubber bushings throughout the rear suspension—pivot eyes for leaf springs and joints for suspension arms and track bars — and rubber is now spreading gradually to the more heavily-loaded inner pivot joints of front suspension arms. This is one thing Cadillac did this year to eliminate lubrication. Industry engineers aren't quite sure yet how far they can "push" simple rubber bushings in more highly-loaded areas, but a lot of research is going into this one because it's the cheapest way to eliminate lubrication. (*Continued on page 78*)

GRAND PRIZE AT RIVERSIDE

by Karl Ludvigsen

The last race of a great Grand Prix Formula drew the world's finest cars and drivers to California.

► It was entirely fitting that the three top British cars — Lotus, Cooper and B.R.M. — filled the front row of the grid for the last *Grande Epreuve* of the 54 such events run according to the 2½-liter Formula 1. It was equally fitting that their respective drivers hailed from England, Australia and America, and that the race was won by Stirling Moss, certainly the outstanding driver of the Formula's late years. And it was auspicious, we hope, that the race was run at Riverside, California and featured the first start-to-finish canter of a U.S.-built Scarab Grand Prix car.

If the race disappointed in any way, it was the absence of the Ferrari team, which is now fully occupied with development of its all-new 120-degree-V6 racing car — lower and lighter than the 1960 F.2 car — for this season. With this exception the lineup for practice was completely representative of 1960 G.P. racing. The big question was: how fast will they go at Riverside? Just a year ago in SCI Griff Borgeson wrote, "Then there are the Hills and Gurneys who say, 'A good F.1 car could get around here in 1.55.'" This proved to be unerring. The only driver to go faster was, of course, Stirling Moss.

With two near-identical Rob Walker Lotuses at his disposal, Moss carved away at his times like the craftsman he is. Pace-setter on all three practice days, he cut Thursday's 1:55.0 to 1:54.6 on Friday, then ran into drive line problems that changed his plan to use the Watkins Glen Lotus (serial no. 906) in this race. His Saturday time was 1:54.4 in the no. 376 Lotus he finally decided to drive.

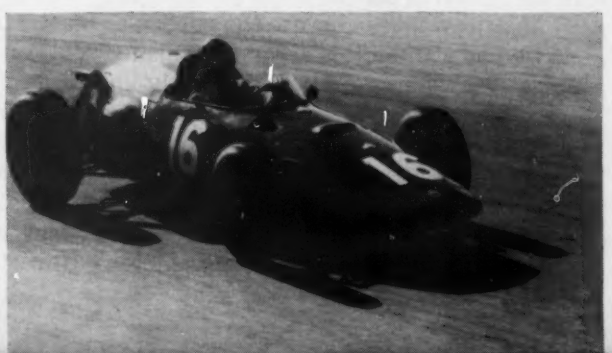
Not far down the line, in fifth through seventh starting spots, were the cars of the tightly-knit Lotus factory team, managed by designer Colin Chapman. At the beginning of 1960 Innes Ireland was the Lotus "star" and Jim Clark a relative newcomer on Juniors and F.2 cars. At Riverside Clark was clearly the faster at 1:55.6, and Ireland the slower, at 1:57.0, on the only one of the three cars to mount its rear brakes outboard, as required by the 1961 Formula. Between the two was John Surtees, at 1:56.6. The team was clearly well placed to accomplish something in the race, if Chapman had strategy in mind.

In the middle of the fifth row, at 1:58.2, was another Lotus owned and driven by admirable Texan Jim Hall, who certainly showed he could travel in fast company at Riverside. His time, set on the second day, was a four-second improvement over his first day's effort and identical to John Surtees's first-day time. The blue-striped white machine was thoroughly maintained and handled in a typical Hall "let's go racing" manner.

Already familiar with Riverside, like Moss, Jack Brabham quickly got into the swing with a 1:56.0 on the first day. On Saturday he turned the predicted 1:55.0 in his factory Cooper, for second-fastest time. Hampered by a high final-drive ratio on the first day, Bruce McLaren turned 1:59.6. He improved on Friday to 1:57.4, the time that stood as his fastest and left him back in the fourth row, far from his usual position as Brabham's backstop. Ron Flockhart had the Cooper factory's 1959 car, doubtless the same one Chuck Daigh drove in the British G.P. this year, and could do no better than 2:04. This left him at the back of the grid, ironically two rows behind Daigh in the Scarab! Practice generally went easily for Charles and John Cooper and their mechanics, who had time to make the scene at Lance Reventlow's Friday-night bash for competitors and overseas journalists.

Our personal choice to take the event was Dan Gurney on the B.R.M., a car/driver combination for which success was

(*Continued overleaf*)



Above, in race's early laps Graham Hill leads the whole Team Lotus into Turn 7. The same turn's entered by Jim Hall's dust-kicking Lotus, at right. B.R.M., below, let Dan Gurney down while in solid second place.

ONLY
1

long overdue. The new lower B.R.M. shown in SCI last month wasn't on hand, since it had already been fitted with a 1½-liter Climax engine in preparation for '61. Certainly the master of driving Riverside, Dan posted 1:55.4 on the first day and 1:55.2 on the last to fill out the first row of the grid. Basically the B.R.M.s seemed steadier than the Lotuses on the tricky esses from the Start-Finish up to Turn 6, but Dan really made this section look easy. "People ask me why I'm not going fast through the esses," Gurney said, part laughing and part wondering. Fast he was most certainly traveling. No stranger to Riverside either, Joe Bonnier's 1:55.6 on the first day remained his quickest – quick enough for the second row. Graham Hill never did better than 1:57.6, which placed him behind McLaren and ahead of Hall.

During practice B.R.M. ran into a common problem: valve springs. This may have led to the decision to change Dan Gurney's engine on Friday night, and to practice only his car on Saturday. Dan ended up with the newest engine, and Graham Hill with the oldest, after this change.

Another batch of Coopers, all 1959-type, was brought to the line by the Yeoman Credit Racing Team, managed by Ken Gregory and technically-directed by Tony Robinson. Of their four drivers Olivier Gendebien and Tony Brooks were fastest, both registering 1:57.2. Olivier had the one car with wire rear wheels, while both had Colotti gearboxes which required a lot of late-night work. A third Colotti-box car, differing from the first two only in the lack of a long duct back to the carbs, was initially given to Henry Taylor, while the team's "old banger", essentially a Formula 2 Cooper with an F.1 engine and old Citroën-type gearbox, was given to Phil Hill.

Phil was of course happy to have a ride, having been released from his existing petroleum contracts, but understandably he wasn't absolutely delighted with this car. Finally after Phil tried Taylor's car late on Friday, and turned some good times with it in spite of some mechanical problems, he was given it for the race. On Saturday, after the seat had been made to fit, Phil turned 1:58.8. This placed him just slower than Jim Hall and faster than Tayor's 1:59.0 (which may actually have been Phil's time in Taylor's car on Friday).

One more Cooper-Climax came to the line, entered by High Efficiency Motors, behind which stand Jack Atkins as owner and Harry Pierce as mechanic. This is the pair that built the first Cooper-Maserati (SCI, December, 1959) for Roy Salvadori, then, early in 1960, bought one of the 1959 factory Coopers *in toto* for Roy to drive. Salvadori's time of 1:59.6 thus compares well with Flockhart's 2:04.4 in an almost-identical car. Salvadori did have the advantage of a Colotti gearbox, one of the dozen of these units now floating around racing.

Modena's Scuderia Centro-Sud took a lesson from the old Jack Atkins car and built a team of Cooper-Maseratis, three of which were at Riverside. All had old-type Cooper boxes and two, those of von Trips and Trintignant, had the familiar 2½-liter Maserati fours developed from the 200SI sports car engine. Of these Trips was the quickest (in spite of the air resistance that must result from his tall frame looming out of the cockpit) at 2:01.4, while Maurice turned 2:03.2. Ian Burgess's third car was unique in the engine room by virtue of having a Birdcage-type cylinder head, with the different layout of valve gear and swapped-around intake and exhaust ports that this implies (a right-hand exhaust indicates the Birdcage head). It certainly isn't going fast yet, though. Burgess could move it no faster than 2:06.6, which was the slowest final practice time – not much faster than Walt Hansgen in a two-liter Birdcage at Riverside!

The older 200SI-based Maser engine showed up in another unique entry, Brian Naylor's J.B.W. Built from scratch, though rear-engined and wishbone-suspended along Cooper lines, the J.B.W. uses a special casting to mate this engine to the input bevel shaft of an early Maserati 250F G.P. transmission. This box, of course, has its shafts placed transversely with the input bevel offset to the left, so in this installation the gearbox ends up more on the right-hand side of the car. Naylor's very neat, clever construction turned a best time of 2:02.2.

Right behind Naylor at 2:02.6, and ahead of five other runners, was Chuck Daigh in the Scarab. This alone was terrific – to see the car well away from the back row of the grid at last. To accomplish this the car had been extensively modified from its European trim by Tom Barnes and Phil Remington, guided and aided by Chuck Daigh. Europe had taught them a lot: that the four's vibration disintegrated the synchronizing cones in the gearbox, making it smarter to leave them out; that a Cooper-like interlock was needed to keep the box in gear; that the twin brake master cylinders were best placed under the driver and worked by a long rod. It also taught them that the car was too big and heavy. Daigh vigorously attacked this. He removed the main gas tank from the tail and, exploiting the crew's astonishing artistry in aluminum, recessed it into the left side of the space frame. As on a smaller tank on the right, the outer tank surface became the "body" at that point. Both nose and tail were shortened, to reduce the length by 18 inches, and by further simplification 100 pounds were taken out of the Scarab.

The engine was pretty much left alone. The post-season experiments in England proved abortive, with a machining error negating Vandervell's redesign of the bottom end, and Harry Weslake's verdict that nothing would do for the cylinder head but a complete redesign. At Riverside the team hoped to have licked a nasty oil-throwing problem that hadn't responded to improved baffling or a deeper oil pan, but had led to installation of a collector pipe from the breather back to the oil tank – as on some European race cars. In Friday's practice a crack developed in a bottom-end plate that had once been welded, and this was replaced on a ramp behind the Reventlow Fiat van by Remington and Barnes, working quietly and efficiently as always.

Backed by Fred Armbruster, Pete Lovely's private Cooper-Ferrari project finally bore fruit at Riverside, a year later than had been hoped and in time (*Continued on page 76*)

UNITED STATES GRAND PRIZE

November 20, 1960, Riverside, California

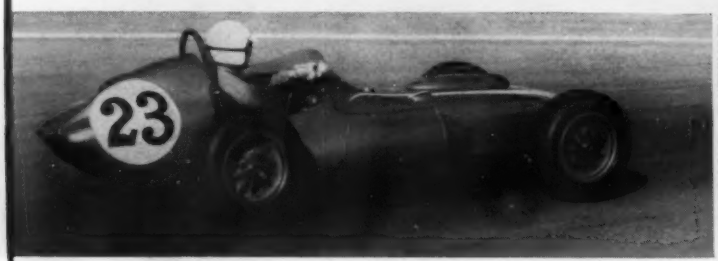
75 laps, 3.28 miles per lap

1	Moss	Lotus	2:28:52.2 (99 mph)
2	Ireland	Lotus	2:29:30.2
3	McLaren	Cooper	2:30:14.2
4	Brabham	Cooper	1 lap behind
5	Bonnier	B.R.M.	1 lap behind
6	P. Hill	Cooper	1 lap behind
7	Hall	Lotus	2 laps behind
8	Salvadori	Cooper	2 laps behind
9	Von Trips	Cooper-Maserati	3 laps behind
10	Daigh	Scarab	5 laps behind
11	Lovely	Cooper-Ferrari	6 laps behind
12	Gendebien	Cooper	6 laps behind
13	Drake	Maserati	7 laps behind
14	Taylor	Cooper	7 laps behind
15	Trintingnant	Cooper-Maserati	9 laps behind
16	Clark	Lotus	14 laps behind

Fastest Lap

Brabham, Cooper, 1:56.3, 100.9 mph

As tall Phil Remington and Tom Barnes disassemble the Scarab, they reveal the fantastic fuel tank sculpture.

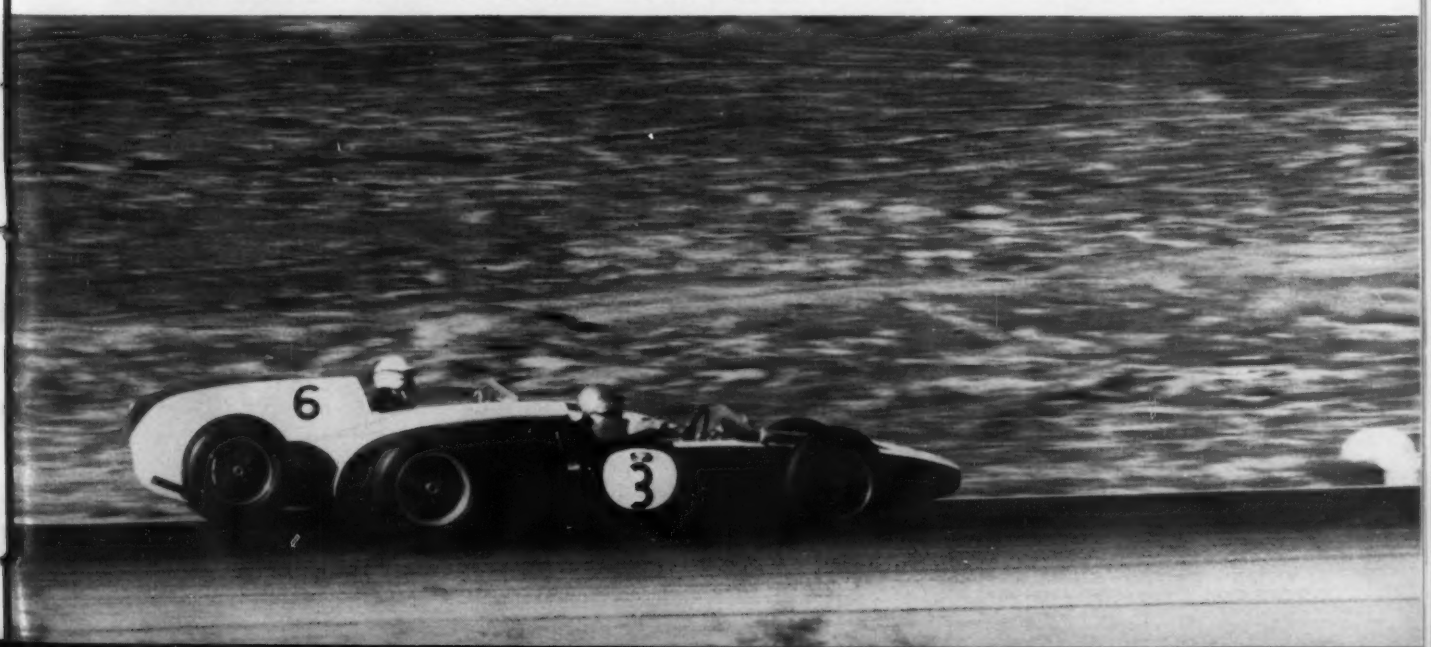


Chuck Daigh supervised Scarab's refinement, then drove it to its best performance yet. Both fuel tanks form the actual exterior body surface.

PHOTOGRAPHY: CHITTENDEN

The sun is low as Alf Francis signals Stirling Moss he's well in the lead. Moss and Lotus were never threatened after Gurney's retirement.

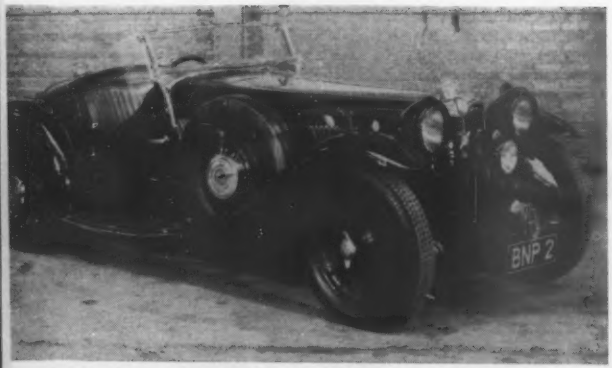
As in Europe, Riverside showed that Tony Brooks (6 here) and Gendebien in 1959 Coopers are a match for Bruce McLaren (number 3) in lower 1960 Cooper.



A K3 MAGNETTE GOES WEST

By Dennis May

Resuscitating this muscular MG K3 Magnette proves that racing cars never die — they're just stored away



Under the spreading fenders lies a competition car. Touring body was designed by K3's third owner for road use.

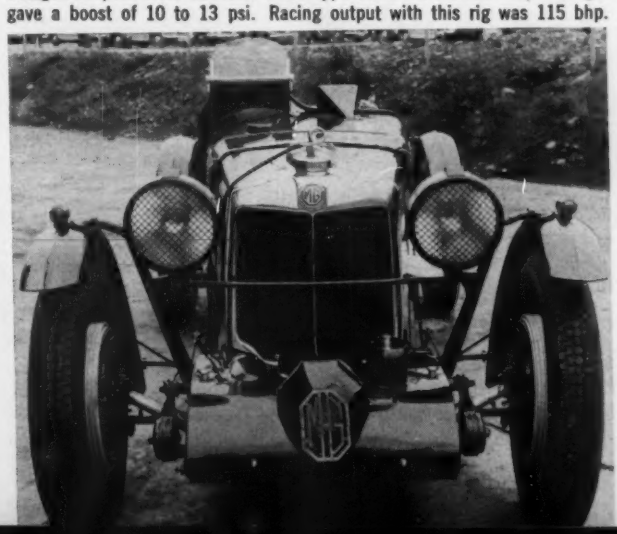
► Let's preselect the past tense and reconstruct the story of a survivor from the middle ages of MG history — a time when the designation Magnette, latterly somewhat disenglamored, had an heroic ring to it. Magnettes of the small Thirties came in two species, on the one hand the unsuffixed K types, which were fastish but civilized sports cars, not primarily intended for competition, on the other hand the hairy K3s, *pur sang* sports-racing eleven-hundreds with fat blowers crowding the crotch between their dumbirons. It is to this exclusive branch of the Magnette family (only thirty K3s were built, not counting two prototypes) that the car pictured here belongs.

K3025 left the factory in April of 1934, the K3's second and last production season, and became the property of Charles Martin, a well-known English amateur driver of the period. I've described the K3 as a sports-racing car but it actually had a dual character; in the words of the K3 supplement to the owners' handbook issued with cooking Ks, "the car can be delivered either stripped for track racing or with full equipment as called for by the Le Mans regulations." In an era of British racing when organizers couldn't afford to be too formula-conscious, most K3 owners donned and doffed fenders, lamps and the rest of the rig's rudimentary sports equipment from meeting to meeting, according to alternating requirements.

Charles Martin was no exception, running K3025 in events as contrasting as the Brooklands Five-Hundred and Le Mans during the one season he raced the car, 1934. After taking delivery on April 17 of that year, he lost no time in getting started; just eleven days later, he and his green Magnette placed eleventh in the 262-mile International Trophy at Brooklands, averaging 82.30 mph over one hundred laps of a chicane-enlivened circuit combining track and road conditions. The winner, Whitney Straight on a blown 3-liter Maserati, did 87.61 mph, but a comparison of these speeds flatters the MG because there was a handicap gook whereby the bigger and faster cars took an acuter and slower path through the chicanes and the smaller and slower ones an obtuser and faster path.

Tim Binnington (left), Jack Mansell (center), and Les Washbroke were the three men who returned the K3 to its pristine prewar racing trim.

Octagon-shaped cover conceals Roots-type Marshall blower. Supercharger gave a boost of 10 to 13 psi. Racing output with this rig was 115 bhp.



Less than a month later, following a brief sojourn and checkover at Abingdon, Martin and the Magnette crossed the sea to the Isle of Man and contested the RAC's Mannin Beg race, a sort of poor man's Monaco G.P. around the streets of Douglas, the island's capital. This time they did better, finishing fourth and eating octagonal dust from three other K3 drivers, Black, Dodson, Eyston.

K3025's third engagement, Le Mans 1934, was to be its sole and solitary racing appearance in sports car garb. Little is relatable about this Le Mans dice, because one of the co-drivers concerned, Roy Eccles, is dead, and the other, Charles Martin, doesn't remember much. So let it suffice to say the K3 placed fourth on general classification, first in Class G, fifth in the Biennial Index eliminator after leading on handicap up to as late a stage as one o'clock on Sunday afternoon, only three hours from the finish. The Martin/Eccles placement in the *G. P. d'Endurance* itself was the highest ever by an 1100 cc car and hasn't subsequently been equaled. The previous year, it's not without interest to recall, an MG Midget had copped the highest-ever 750 cc placing at Le Mans, sixth.

The merit of K3025's Sarthe performance in '34 comes into proper perspective when we add that Martin and Eccles covered 1656 miles in the 24 hours, or 92.2 percent of the distance run by the 2.3 blown Alfa Romeo (Chinetti/Etancelin) which won — 1793.94 miles. Incidentally, the 1934/35 Index qualification secured by Martin on K3025 had a memorable repercussion: he used it in '35 for the Aston Martin entry which sensationally placed third overall, won Class F and the Rudge Whitworth cup (Index), set a fifteen-hundred distance record which was to withstand attack until 1950 and then take a beating by only ten miles. It's thus no sophistry to say that a Magnette, proud and permanent possession of MG's Northern Californian distributorship, laid the foundation for Aston Martin's finest Le Mans exploit — and we don't exclude Mr. Brown's 1959 victory.

Charlie Martin didn't rest overlong on his Le Mans laurels. Just six days later, hardly allowing himself enough time to un-nail the fenders and chandlery prescribed by the A.C. de l'Ouest, he was back in a Brooklands lineup for the British Empire Trophy, run around a chicane-fraught circuit not unlike the International Trophy course he'd traversed earlier. Perhaps by way of protest against lack of respite and proper preparation, the MG developed a sulk and finally desisted with negative oil pressure after two hours' action.

Fifth and penultimate race on the K3's program was the Brooklands 500, which counterparted Indianapolis in distance but very little else. For this they used the full banked track, enabling all but the biggest and fastest cars to go flat out all the way. Here, therefore, Martin's problem was simply finding enough maximum speed to beat his class handicap. In search of it he replaced the standard SU carburetor with a big Solex, raised the Magnette's mathematical compression ratio, fitted a special exhaust system with two three-stub offtakes and dual main pipes, modified the intake manifolding from single-branch to twin-branch layout. These changes had their effect but not enough (*Continued on page 84*)

DRIVING THE K3 MAGNETTE

by Griff Borgeson

Back in the days of steel men and cast-iron cars MG's K3 Magnette tried the strength of the toughest European drivers. Step over the red-hot exhaust pipe into the passenger's seat and find out why.

► In the world of the perhaps not-distant future when motorists glide tirelessly in ground-effect machines or GEMs, as current SAE nomenclature has it, an inevitable comment will be, "The old-time drivers either were awfully reckless or awfully brave. Imagine driving at speeds they did . . . on *tires!*"

We are the old-timers being referred to and, of course, we're usually quite content with the best products that our technology can deliver at any given moment. Charles Martin must have been a very contented man when he raced K3205. But from our vantage point in history Martin and the others who raced K3s were reckless or brave. And they had to have an appetite and tolerance for punishment that is not easy to conceive today. This was the recurrent theme of our shouted conversation as Jack Flaherty and I jolted and charged about San Francisco in K3205's first extended outing in California.

Flaherty is an astute analyst of the general scene and of motor racing matters in particular. He made a big name in West Coast roadster racing, backed it up with a couple of championships on the ARA sprint car circuit and, for the last couple of years, has been doing a more than competent job of handling British Motor Car Distributors' Lister-Jag. He's also a top executive of the firm. He said of the Magnette, "Five miles in this car at speed and you've taken a beating. How could they do it for 500 miles? And imagine what it was like at Le Mans!"

When we entered the spacious building that houses Qvale's (distributor for BMC and numerous other British automotive products over a large portion of the western U. S.) competition department the Magnette squatted alertly, awaiting its airing with well-cambered front wheels akimbo and looking very *pur sang*. The restoration job had been thorough and the skinny, bristling creature was manifestly rehabilitated, body and soul.

We entered the vehicle, a memorable operation. The passenger stands at a respectful distance from the probably-hot Brooklands silencer, arches his right leg high and inserts it somewhere in the narrow trough at the left of the transmission. Next he does a backhand push-up on the rear of the body and swings his left leg aboard and sticks it into the trough. Now he can settle into the U-shaped, 13-inch-wide bucket seat. He's then ready to put four psi of air against the fuel in the tank by means of a hand pump and gauge on the dash.

For the driver, entry is slightly more difficult. The trough for his lower extremities contains assorted pedals and his left foot must feel out just the right spot. Supporting himself on that leg, with his hands behind him, he heaves the other leg into the tonneau and then snakes his way down behind the steering wheel. This 17-inch-diameter structure is adjustable fore and aft on the steering column. In the full-forward position it just provides clearance for the torso of a small and slender man; adjusted aft there is no room for his solar plexus. The driver's hips are assumed to be no more than 10½ inches wide; that's the width of that bucket seat.

Having achieved entry the occupants can contemplate their unusual and favored situation. Just to the left of the steering column is a mammoth six-inch tachometer. All the other instruments are of standard size and one is forced to speculate whether myopia and the apparent courage that can accompany it were required of K3 drivers. The only other instruments placed conveniently for the driver's viewing are the tiny pressure gauges for the front and rear Hartford shocks; these can be loaded hydraulically by means of handwheels that are sequestered up behind the dash.

The co-driver has a panoply of instrumentation to observe, including gauges for manifold pressure, fuel and oil pressure, temperature of water and of oil. Also in his range are a few unidentified three-position toggle switches, the light switch and a handwheel below the shifting quadrant for taking up slack in the brake cables. There is no speedometer or ignition lock.

Using a Ki-gas (*Atmos* on the vintage continent) primer the driver injects some raw fuel toward the cylinders. He retards the spark-control lever which parallels the quadrant and steps on the starter button which is palpable but out of sight somewhere on the firewall. There barely is space for the toe of his right foot to touch the narrow throttle pedal which is located against the right-hand body panel.

The engine erupts into raucous life. Its displacement is 1100 cc but this is difficult to accept because of the power plant's vigour and storming voice. The blower and cam-drive gears whistle stimulatingly and, at idle, the blower-drive coupling makes a rhythmic clunking sound which heightens the effect of anxiety. The engine is splendidly, excitingly noisy and its exhaust note in spite of the sham silencer is imperative, authoritative, urgent, strident. It evokes images of shards of plate-glass window in its wake. Its promise of thrilling motoring is foresworn and beyond doubt.

We harried a cable car up California Street's steep hills, lugging away strongly most of the way at about 2000 rpm in top gear. The engine felt as though it had three or four times its actual displacement and reminded us of the transformation that can be wrought by a Roots blower delivering 10 to 13 psi boost. (*Continued overleaf*)

Parked, the beautiful little machine attracted crowds everywhere. In spectacular, cacophonous motion it did nothing to improve the flow of city traffic. We actually were pursued and run down by a loaded municipal bus whose driver had to know the identity of the rare bird that bore us. The almost invariable leading questions were, "What is it?" and "How old is it?" The latter was very understandable. The pristine Magnette has the ageless look of great architecture.

Lever-locked radiator cap and steam condensing coil are both ornamental and useful. Rubber hose leads overflow down and away from racing screen.

Some of its most salient features seem to be no more than gimmicks but they make a valuable contribution to the car's total impact. The huge tach is in this category. The twin filler spouts for the fuel tank – presumably for convenience in fueling from either side – offer no visible improvement over a single, central spout. But the filler caps are so beautiful; perhaps the builder couldn't stop with just one. The radiator cap also is a gem. What useful purpose its little copper coil serves I can't imagine. It's an overflow fitting and the coil is justifiable only as a condenser. Who cares whether steam or water is discharged from this outlet? But it looks fine and racy and adds a moody, alchemistic crowning touch to the total composition.

One of the K3's most interesting features of course is the E.N.V. preselector gearbox. With it all shifting is done in a single plane. Reverse is the farthest position forward and has a lock-out toggle. One notch backward puts you in neutral, another notch in first and so on to fourth. Naturally you fire up the engine with the shift lever in neutral. Then, without touching the clutch, you put the lever in the next gear position. Nothing happens until you depress and release the clutch pedal, which puts you into the selected gear. The clutch is on the fierce side and getting underway in first or reverse demands precisely synchronized movements of clutch and throttle pedals. This is complicated by lack of a throttle foot-rest, a tiny pedal and a ratio of about 500 rpm to 1/16 inch of pedal travel. Chattering starts tend to be the rule.

Once the car is in motion these operations are simpler but still demand the touch of a skilled, thinking driver. As Dennis May states, the combination of preselector with sudden clutch requires the same clutch-throttle-rpm coordination that should be used with a conventional transmission. This is true of upshifts as well as of downshifts. To pop the clutch on an upshift without first lifting your foot from the throttle results in a jolting ratio change that can do the mechanism no good. But once these points are learned the preselector can be shifted with extreme smoothness and good speed, the clutch taking hold positively and instantaneously with a deliciously abrupt change in exhaust note.

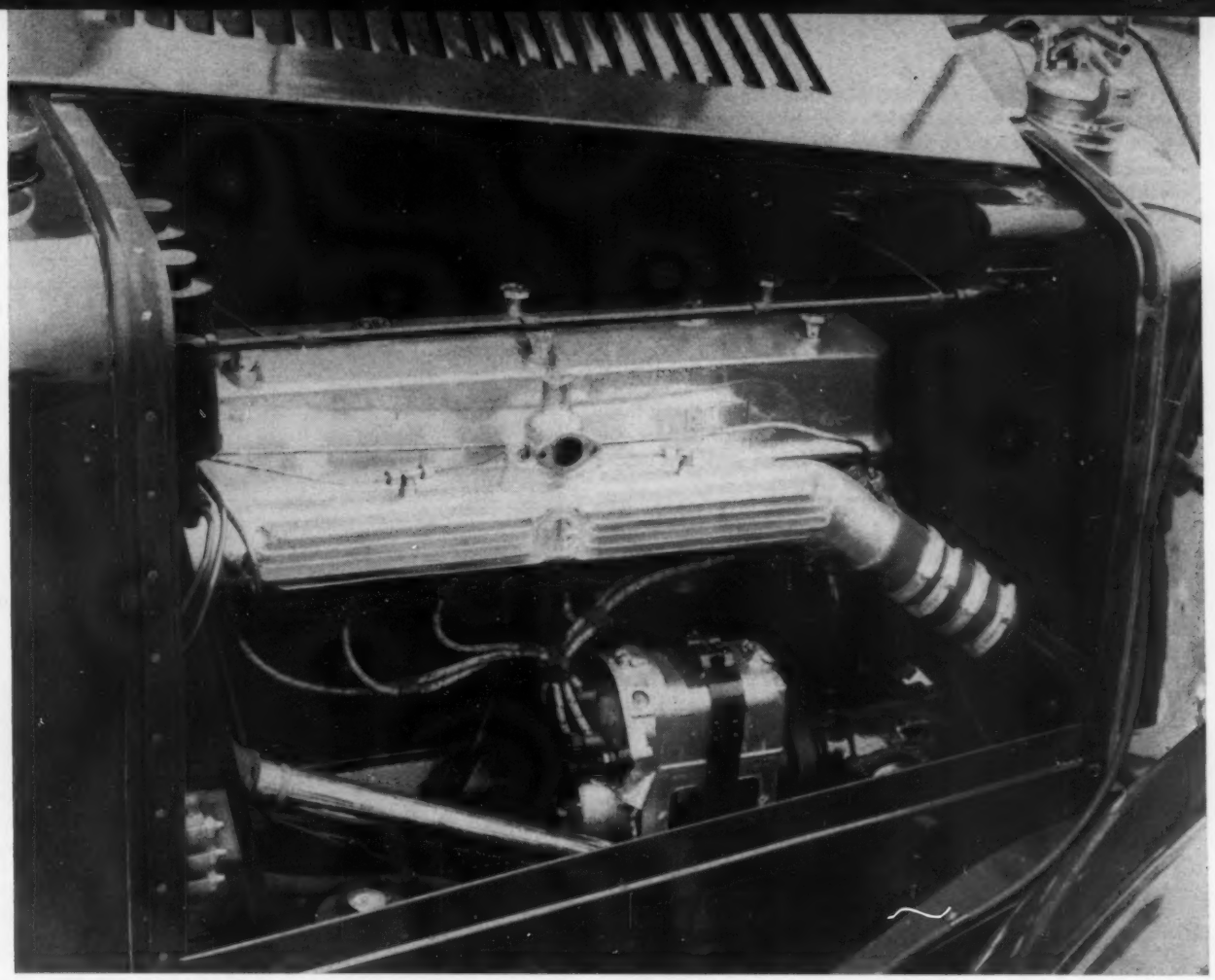
Nuvolari's historic problems with the Magnette preselector (SCI, June, 1957) are readily understandable. It takes some living with the device to feel at home with it. Flaherty and I found it difficult to imagine situations in which the ability to pre-choose a gear would offer any significant advantage over a conventional transmission. Also, if you're in the midst of action and pre-select too soon, it's easy to forget just what the hell gear you are in and what will happen the next time you pump the clutch pedal. In such cases you have to take your eyes from the road and analyze the positioning of the shift lever. The limited use of preselectors in racing and road cars suggests that their merits, if any, are minor.

Assuming Dennis May's 4.89 final-drive ratio the car should accelerate hard. It does, right up to the 4600 rpm or 80 mph to which we limited ourselves. The 8000 rpm tach is redlined at 5500 (for first and second) to 6500 (for third and fourth). The last figure equals 114 mph with the 9/44, 4.89 cogs.

The car's steering is truck-heavy at very low mph, in common with such thoroughbreds as the 2.3 Alfa Romeo of its day. Above 15 or 20 mph the steering becomes quite light and is very quick and positive. The 16 by 1¾-inch brakes perform excellently but of course have high pedal pressure by present standards.

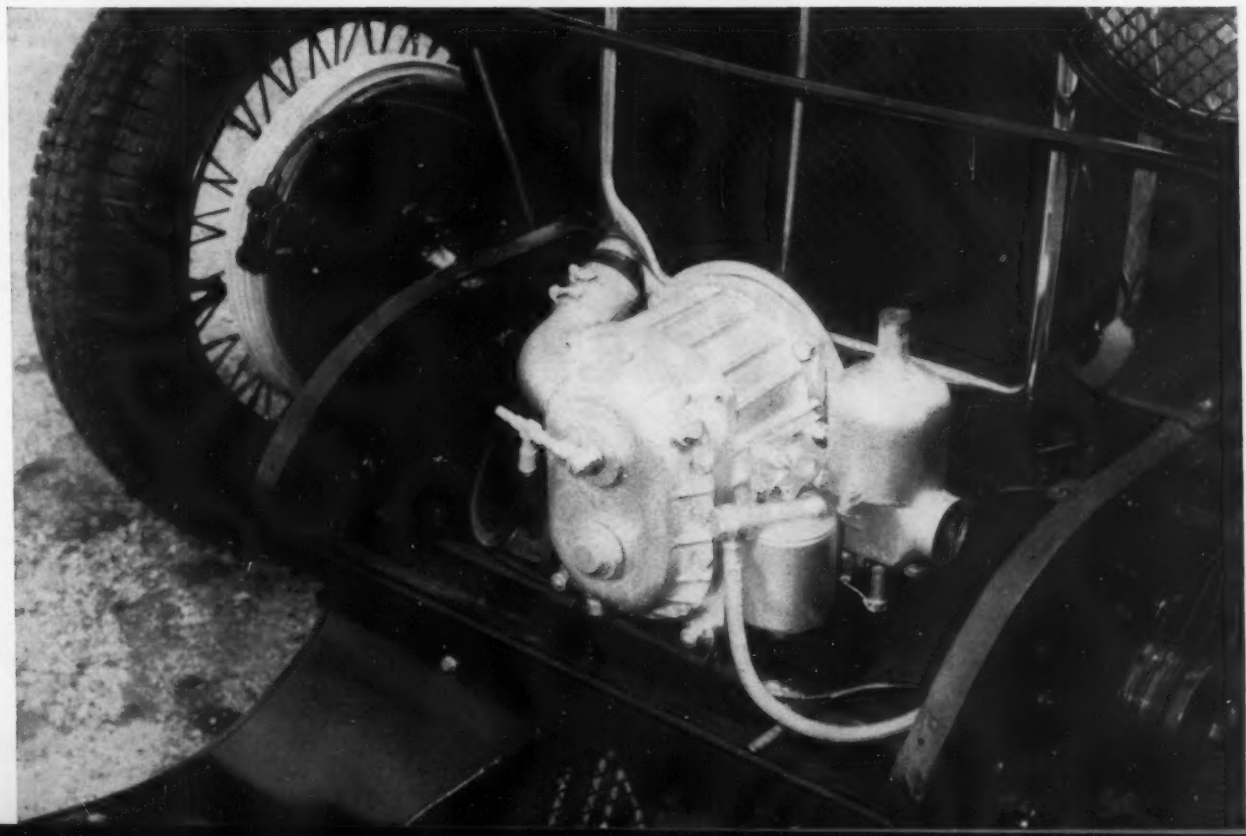
The car tracks securely at speeds although its ride is harshly choppy and jolting, not unlike an MGA with 24 psi in its tires. We did not have a course available on which to probe deeply K3025's cornering manners. But we did get in some sporting licks on quiet, curving roads and were impressed by the machine's classical, on-rails feel . . . and by the spooky feel of its high roll center.

The K3 Magnette is immense fun and excitement and a challenge to drive in the noble sense that *nothing* will take the place of the open-cockpit biplane. But when you drive it just moderately fast and then ponder the meaning of driving it extravagantly fast for great distances, as men did, you can't but wonder at their awesome fortitude, even though they were driving the most advanced equipment of their day. Then, thinking back through the decades to the hurtling, unmanageable monsters of the Paris-Madrid era, you're reminded of that breed of chauffeurs that co-existed with iron men and wooden ships. In a sense it's all the same: men never have had more than one life to take chances with. But 1656 miles in 24 hours on a rocketing buckboard! There would be few takers for that ride today. *—GB*



K3's straight six is simple and uncluttered by modern standards. Finned intake manifold has flexible joint connecting it to front-mounted blower.

Roots-type blower is fed by single giant S. U. carburetor. Hinged sheet metal cover shields it from dirt and water. Brakes are cable-operated.



Bob Donner's racing philosophy is easy to state but difficult to practice . . . . . "If you're going to win, ..."

Conservative Charger

by Hile Goodrich and Dick Burnell

► Among the sports car pilots who cultivate the art and the sport with finesse above and beyond mere fundamentals is Bob Donner, Jr., an up-and-coming Porsche pusher from Colorado Springs, Colorado. In the field of motor sport he's waiting in the wings, waiting for a few changes in circumstances before coming on stage. In private life he owns and manages a radio station and rides herd on investments on the side. Since 1956 Donner has pretty much ruled the roost in the Rocky Mountain area, losing only when big-bore machinery outclassed his 550 RS Porsche Spyder on courses with long straights. Donner's partisans — and they are legion — have become in some ways as overbearing in the Denver neighborhood as New York Yankee fans in days of yore. They were held in check chiefly because on the relatively few occasions when their champion stepped outside his domain, some of the big boys showed him how a Porsche tailpipe looks. But Donner changed all that.

If Donner's Porsche-pushing career should someday take on an international flavor — a prospect that seems quite likely — then wise men of racing would certainly point to 1959 as the year this owner-driver came of age.

He started the year right by graduating from the 550 to a new RSK with a 1500 cc engine. With the new machine he turned in his most impressive season from several points of view. While continuing to rule the roost generally in his own back yard, he stepped outside to take some notable class wins in national SCCA competition and caused some eyebrows to arch upwards in the process. It was also his busiest season, a fact from which several inferences might be drawn, such as: 1) Donner is getting serious about racing, 2) keeping busy on race courses kept him sharp, 3) he wanted to get his money's worth out of the RSK.

The 29-year-old Donner chalked up an important mark early with his performance at Elkhart Lake in June. Donner and another Porsche veteran, Don Sesslar, engaged in a lap after lap duel with Sesslar generally in the lead at the end of each lap. Near the end of the race, won by a Lister-Chev, Donner dropped well behind Sesslar and the duel seemed over. But on the last lap on Elkhart's vicious corner Number Five, Donner went in fast, swept the outside as Sesslar hugged the inside. When they came out of the corner Donner was in second place and stayed there to win first in Class "F" Modified. Old Elkhart hands shook their heads because, as they explained, "you just don't go through Number Five that way." Since that June day they've put that remark in the past tense.

Donner's partisans note with pleasure that the Sesslar who trailed their man at Elkhart drove an RSK at Sebring in 1959 and placed ahead of one factory-entered 1600 cc car. The same Sesslar went on to take the national SCCA class FM championship, having competed in considerably more national events than did Donner. The Colorado driver would be the last to contend that he could beat Sesslar again, either at Sebring or at Elkhart, but the comparison is enough to make a man and his friends wonder.

STEWART'S COLORADO SPRINGS

Donner dusts through an "S" bend on Pike's Peak in 1959. A few moments later he left the road. This was one of his rare competition failures.

A month after Elkhart another national SCCA meet was staged at Buckley Field near Denver. West Coast writers who covered the event en masse evidently hadn't heard about the earlier run at Elkhart. They placed their bets for class FM on Chuck Howard, West Coast FM champ of the year

before, who brought an RSK to Denver.

In a preliminary race Howard in one long straight found himself right behind Donner with lots of "stuff" left. He swung out to pass, evidently not aware he had been cruising with the benefit of Donner's slipstream. When Howard swung his car out into still air, the vehicle spun violently at something near 100 miles an hour. In another race the second day of the meet, Donner and Howard were having themselves a fine dish when Howard had to pull into the pits with a pair of scuffed rear tires, the result of the spin the previous day. Donner came close to calling his shots too closely in that one. His car sputtered across the finish line still well ahead of the field and then died 100 yards beyond — completely out of gas.

Still not convinced, the West Coast crowd predicted that Howard, with new tires under him, would feed exhaust to Donner in the 100-mile, 25-lap feature over the long airport course. Donner finished first in class FM and fifth overall behind a Scarab, two Ferrari Testa Rossas and a two-liter Lotus.

In regional competition, Donner dominated races at the new Continental Divide Raceways south of Denver. The 2.8-mile course there has 10 corners, making it a circuit ideal for small machinery.

For the second race there, in September, Hap Sharp of Midland, Texas, brought along a combination that many thought could catch the Donner Porsche, which had run off from everything in the first meet at the new track. Sharp's rig consisted of a three-liter Ferrari Monza mill packed into a Maserati chassis that had previously carried a two-liter engine. In a preliminary race the Sharp hybrid showed fantastic acceleration in the three-quarter-mile straight, but after going through the 10 corners in each lap, there was Donner's Porsche on his tail for the final corner. Sharp spun out finally, and Donner won again. In a second warm-up race, Sharp held his machine on the course and set a new lap record of 73 miles an hour. That seemed to settle the issue with the RSK, but for the final race Donner changed his driving technique, electing to go into corners faster and farther while dropping his rev limit by 500 rpm to make sure the engine wouldn't be strained over the extra distance added to that feature event. The result — perhaps surprising to those who associate net speed with a full throttle — was that Donner early in the race equaled Sharp's brand new lap record and poured pressure on Sharp. Sure enough, Sharp spun out, and Donner rolled home for another win.

As if this wasn't enough, after the race it became generally known that for the Continental Divide appearances Donner had mounted an extra Carrera engine in the RSK chassis. He held back the regular RSK engine for such national races as his final appearance of the season in October at El Paso, Texas.

There he and Pat Pigott staged a duel between Porsche and two-liter Lotus, the same machine, incidentally, that finished ahead of Donner in the Buckley national race. At El Paso Donner finished some 20 feet behind the faltering Pigott machine for a first in FM and a second over all.

As a result of this 1959 success, especially the duels with Sharp's Maserati-Ferrari at CDR, Donner became "Rapid Robert" in the Denver press. The nickname smacks of a hairy-chested leadfoot.

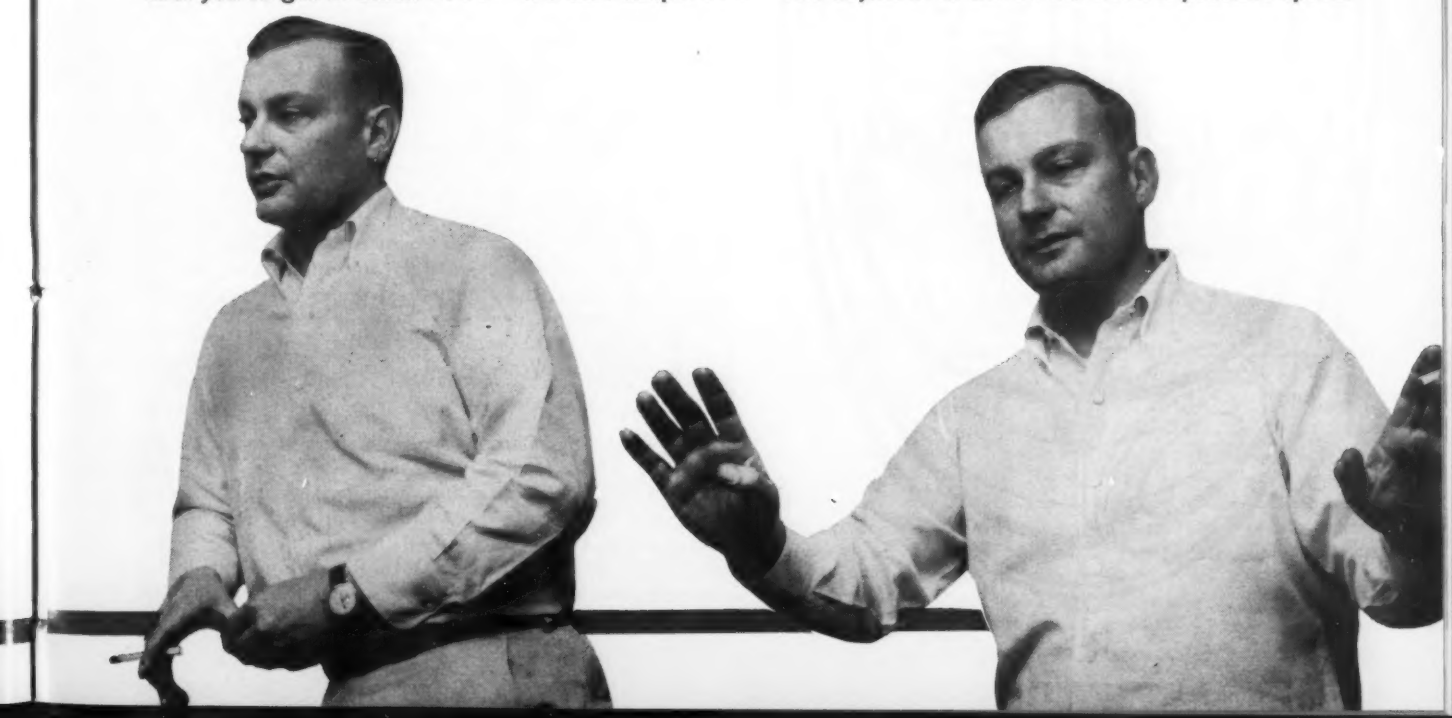
The name doesn't fit, although Donner may in fact have a hairy chest, and the fact that it doesn't fit is the prime reason why Donner may develop into something more than a pleasant chap who enjoys himself around regional SCCA runs.

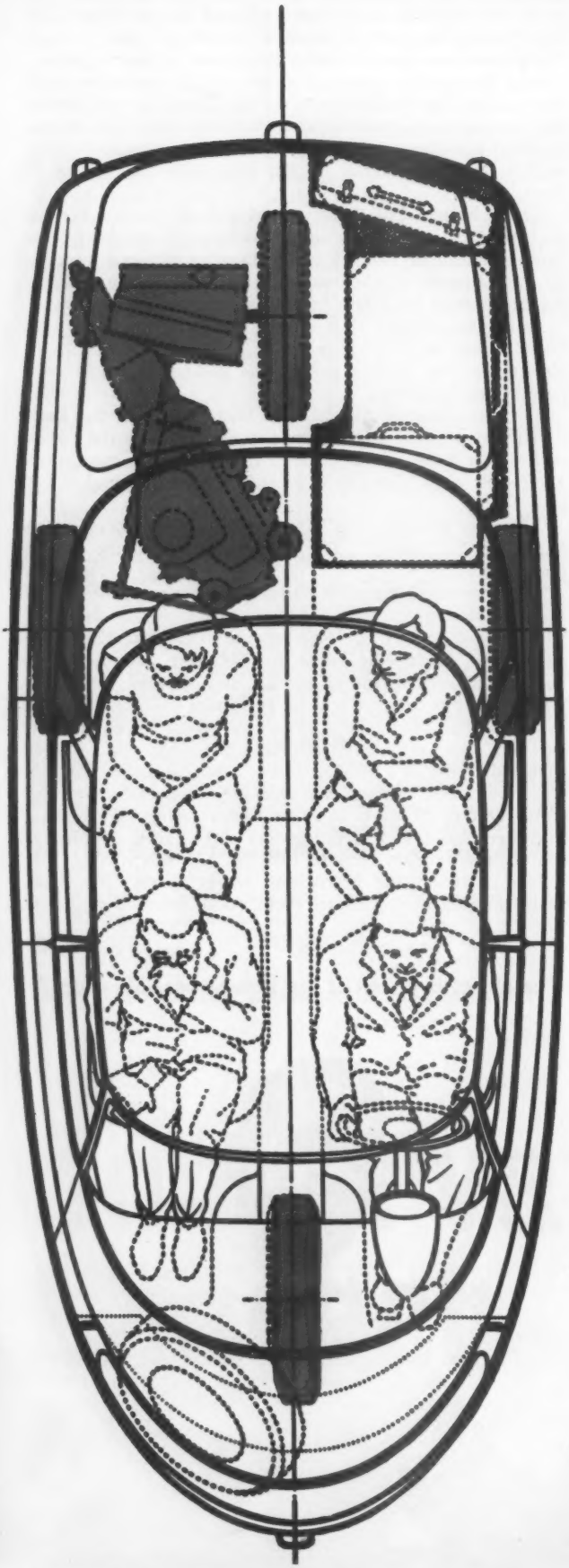
"If you're going to win," Donner says, "first you've got to finish. It's that simple. The object is to win at the slowest possible speed."

This slow-moving racing philosophy, Donner contends, is the only strategy he has. He drives religiously by the tach, with the red line on the RSK engine marked at 8200 rpm. At Elkhart the needle swept to 8800 rpm "accidentally," but that didn't happen on the last lap in which he passed Sesslar. As has been shown, he prefers to push farther into corners rather than take a chance of taxing an engine too heavily. This approach is anything but what you'd expect from a driver with a hell-for-leather reputation. For Donner the conservative outlook has paid off handsomely over the years. Out of 37 starts since he began racing in 1953, his machinery has failed to finish only three times. Ironically, two of those failures came in 1959, his best season.

The brake on the right front wheel of the new RSK started locking in the feature event (*Continued on page 90*)

"first you've got to finish . . . ." "It's that simple . . ." "The object is to win at the slowest possible speed."





THE INGREDIENTS OF X

by Ing. Alberto Morelli

Pininfarina's new "X" prototype, soon to be tested on the road, probes more deeply into engineering and basic design than European stylists have yet dared. Here its designer frankly discusses the advantages — and disadvantages — of a wheel layout tried by Sunbeam and Voisin in the past.

► Special care was taken in the development of the aerodynamic design of this car. To reduce wind resistance, its shape was laid out to provide a constant change in cross-section from front to rear — a smooth transition from a small section at the front to the largest at the center and back to a small section at the rear. This was, of course, facilitated by the rhomboidal wheel layout: two wheels on the centerline and two on each side. The front-to-rear sections were also laid out to minimize the effects of air flow on the wheel loadings, for reasons which will follow.

Studies have shown that the maximum *possible* weight on each wheel must be equal, if tires and wheels of the same size are to be used at all four "corners". Thus since the outboard wheels are subject to a greater increase in load in curves than affects the front wheel under braking, the following static weights have been found necessary:

Front Wheel: 990 pounds, 37% of the total weight.

Each Outboard Wheel: 350 pounds, 13% of the total weight.

Rear Wheel: 990 pounds, 37% of the total weight.

This weight distribution, with the highest loads on the center-line wheels, makes it possible to use the front and rear ones only for steering and driving respectively. Driving at the rear only is obviously simple but does have several disadvantages. Under acceleration the total available engine power can't be applied below 18 mph, against 13 mph for a conventional car, but since these speeds are very low the practical difference is very slight. Also, since there's no differ-

Fore-and-aft placement of the side wheels decides whether an "X" type vehicle will understeer or oversteer: the farther back, the more understeer.

Disc-braked nose wheel runs in circular well that allows steering movement. Effective bumpers might make the "X" look like a carnival car.

Offset rear engine allows half of the tail section to be used as a trunk. Final-drive casing is placed just below right tail and back-up lights.

ential the likelihood of loss of traction through slippage of the driving wheels is diminished by half!

Among the obvious advantages of one steered wheel are the simple steering geometry and lightness of the steering gear. Since the three rear wheels are non-steering, these must necessarily slip on a curve, even at near-zero speeds. The layout is such that the slip angle of each tire is always less than the maximum possible angle. When the vehicle takes a curve at high speeds and geometric factors cause the tires to slip, they reach the limit of slip sooner than the tires of a traditional car, but this is only a problem – and a small one – in corners with a radius tighter than 90 or 100 feet.

Theory shows that the handling of the "X" should remain practically neutral under normal conditions, but will ultimately oversteer, the condition usually preferred. It was discovered during testing that almost any handling characteristic could be produced, at will, by moving the pair of outboard wheels either forward or backward. The farther back the wheels are placed the greater the degree of understeer, and vice versa. This proved a fundamental advantage of the rhomboidal layout, for it made possible rear engine mounting – necessary with today's engines to get a good aerodynamic shape – without excessive basic oversteer. The rearward placement of the outboard wheels shows how this was in fact accomplished.

The placement of the engine on the right side, at the rear, made room for a luggage compartment on the left and also balances the weight of the driver, who sits in his usual place on the left. The car may thus almost always be "balanced" by shifting passengers or baggage a bit to the right or left. Though this is advisable, it's not absolutely necessary.

Synthetic rubber springing and shock-absorbing units at each wheel are anti-roll, that is, they operate in such a way as to compensate for roll on curves and pitching under braking and acceleration. In addition the rhomboidal wheel layout helps the accelerations involved in pitching and rolling, since only two suspension units are involved in such movements instead of four, as in the traditional car. To be specific, pitching frequencies are reduced by about 5 percent and roll frequencies by about 14 percent. Respective accelerations are thus reduced by 10 and 26 percent.

At present the "X" is powered by a Fiat engine and four-speed box, which should drive the car to a 90-mph top speed in view of its low aerodynamic coefficient (C_w) of about 0.20. It's braked by a Girling disc at the front and by drums on the other three wheels. Because the engine's in the rear, Pininfarina felt it necessary to provide a curved air-filled cushion ahead of the front wheel to spread out the forces from a possible collision. All these features will soon be tested by Sergio Farina and chief engineer Renzo Carli, who hope to have Morelli's creation on the road in early '61.

—Jesse Alexander

ALL THE WORLD'S ENGINES

by Brock Yates

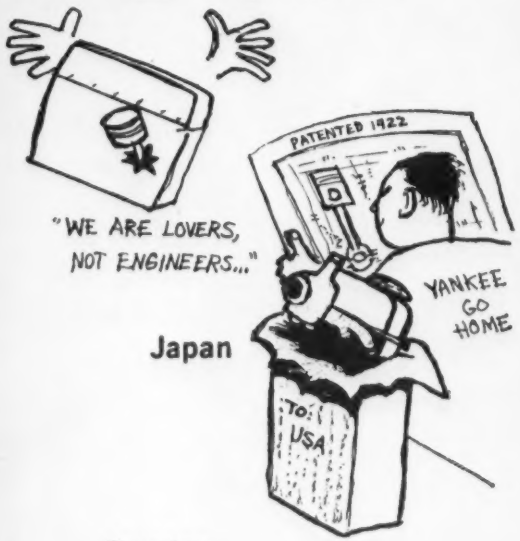
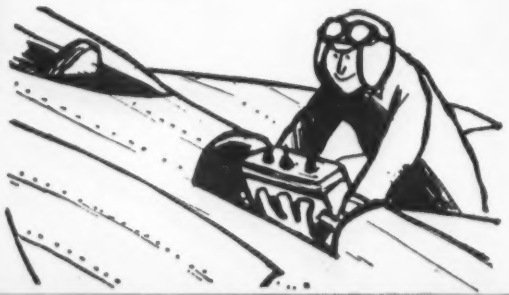
Germany

England

U. S.

Russia

Displacement	Power	Designer	For use in	Fuel	Engine type
150 cc	None of your business	GERMANS!	Rennwagen und Panzerwagen	Crude oil	Counter-rotating, slide-valve, three-stroke turbo-thing
Two liters	43 bhp @ 3500 rpm	Sir Randolph Parker-Huntsman (in 1922)	Touring saloons but easily modified for sporting use, my good fellow	Most anything will	In-line pushrod four (really, old chap!)
586 cubic inches	400 bhp (honest)	A team of 26,000 clean living American engineers	The biggest, most wonderful cars in the world	Runs on regular	Crimson Tornado (ultra-modern o.h.v. V8, for those who care)
587 cubic inches	401 bhp	A team of 45,000 clean living Soviet scientists	Tractors, trucks and ICBM tow-cars	Workers perspiration you indolent capitalists!	o.h.v. V8 (Americans are no-good copycats)

Italy	850 cc	300 bhp @ 10,500 rpm	Ing. Bellini, ex-chief engineer for Ferrari, Maserati, Fiat, Alfa Romeo, etc.	Racing cars, what else?	Nitromethane	In-line d.o.h.c. four
France	Somewhere between one and two liters (we think)	More than the Italians but probably less than the Germans	Le Patron's second cousin	Paris, you idiot	Love makes the world go 'round, Monsieur	C'est la vie
 Japan	Two liters	43 bhp @ 3500 rpm (so solly)	Nipponese engineering students (between riots)	Small export sedans (keep those tariffs down, you hon. Yankee dogs)	Atomic dust (Yankee go home)	In-line pushrod four (so solly)
 Sweden	750 cc	Who cares? We've got Anita Ekberg!	Swedish engineers, stupid	Economy sedans and supersonic jet planes (honest)	Equal parts oil and anti-freeze	Two-stroke three . . . Who cares? We've got May Britt!

RACING CASINGS

by Dennis May

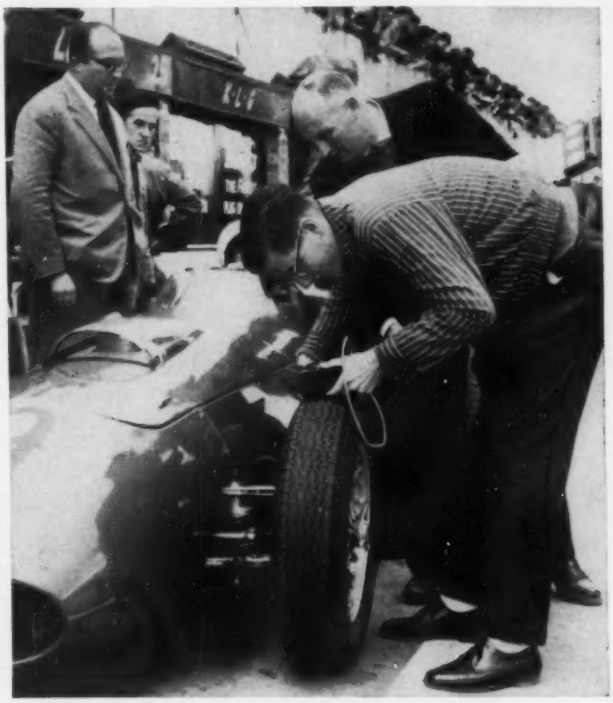
The Dunlop man at a modern G.P. race is the focal point for all tire problems. Meet here the men who are responsible for their company's undisputed lead in road-racing tires.

Dick Jeffrey, Dunlop racing manager, talks tires with two Americans familiar with racing cars — Phil Hill and Carroll Shelby.

► It's easy to put your best foot forward when your competition is treading on your tail. Dunlop's car race division formerly had Pirelli and Avon treading on its tail, and it was under this stimulus that the Fort's technicians embarked, late in 1956, on the design and development of the R5 racing tire. The results are history. Launched at the start of the '58 season, the R5 was acclaimed by drivers and team managers as the world's finest road race tire, worth two to three seconds per Silverstone lap, compared with its R3 predecessor, on the then-current Grand Prix cars. It was versatile too, showing proportionate savings on circuits as contrasting in configuration, surface and speed potential as Goodwood and Monza.

Then, with Pirelli's retirement from speedwork (they stopped making racing tires in 1955 or '56, though stocks were available in '57, and in fact Vanwall used them that year), the pressure eased. It was to ease further when Avon called *Pax* at the end of 1959, though the elimination of this competition couldn't have been foreseen, of course.

But Dunlop showed no inclination to lean on its laurels. In October of '59, at the Oulton Park Gold Cup meeting, insiders were bandying a new symbol, D9, in the same breath with R5. The latter designation, indicative of a tread pattern, hadn't and still hasn't gone out of currency, but the D9 suffix denoted some new technical developments whose effect was soon to be on every lip. Silverstone tests showed lap time reductions of up to 1½ seconds. "The greatest invention since bottled beer" commented a leading driver



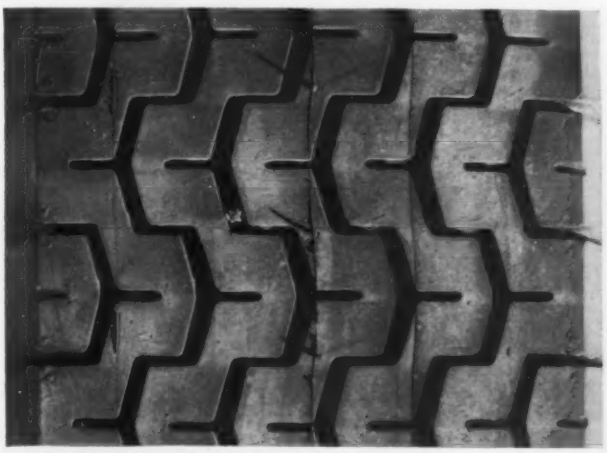
After every fast practice lap (at every race!) Dunlop technicians are on hand to measure temperature and tread depth on the 14 fastest cars.

who holds bottled beer in some reverence.

Since that time the D9 and its unidentical twin, the D10, which is for abrasive circuits and has higher wear resistance, have achieved a supremacy without precedent in the history of road racing. In 1959 and '60, every *Grande Epreuve* in the book, and an overwhelming majority of international sports car classics, were won on Dunlop.

Today's generation of drivers is getting the tires it deserves. David McDonald, alias Dunlop Mac, doyen of racing tire fitters – '61 is his fiftieth year on the company's payroll – remembers a time when most drivers, and the British in particular, thought they knew more about tires than the men who made them, and would covertly fly in the face of expert ruling on, for instance, pressures for given conditions. But latterly, with the growth of professionalism in racing, drivers and team managements have acquired the pro's respect for specialist knowledge and experience in an esoteric field. This is acknowledged by everyone on the Dunlop car race division, from fledgling fitters up to the company's Racing Manager, Mr. R. H. Jeffrey, a burly, blond, bonhomous Ulsterman, and Mr. Don Badger, Technical Manager (Racing).

Essence of the relationship between those who make and those who use racing tires is interdependence, says Terry Hampton, a leading light of Mr. Badger's technical team.



Dunlop's most successful G.P. tire to date — the R5. Its distinctive wide "Y"-shaped tread stamps the wake of every modern Grand Prix car.

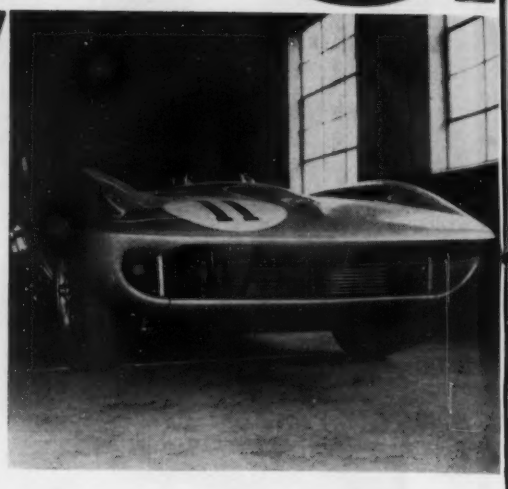
He and race service representative Vic Barlow live with the Grand Prix circus nine months out of the year. Inseparable as they are from the instruments and paraphernalia of their craft, they never underrate hints from the horse's mouth. So far from calling it a day when training or racing finishes and their last temperature and measurement is taken and minutely recorded on sixteen-column charts, Terry and Vic shift into social gear, so to speak, and go trawling for revelatory shoptalk. Probing, prompting, listening, trading drinks, they stay with the job far into the night.

"Drivers and team managers have to *know* you," Hampton says. "Then they will give you their confidence. This is important because you can't dictate, only advise. Occasionally, not often, a team chief will get some ideas – on pressures, for instance – that are different from ours. Then, the chances are, he will come to us and ask can he go down a couple of psi on the back wheels, say, rather than just going ahead and doing it. We then consult our data and, if no risk is involved, give the OK. As far as we're concerned, if he wants to run his tires harder than datum, that's always OK because temperature goes down as pressure goes up."

Drivers or *equipes* seldom override Dunlop's recommendations on a tire problem nowadays, but it can happen. When it does, the story usually has a moral. In the TT at Goodwood last August, life of the Ferraris' tires was calculated at 55 minutes. Willy Mairesse overstepped this limit – and paid for it after 63 minutes.

But it's circuits, and their reaction to unpredictable weather changes, that cause most headaches for the tire people – not drivers' whims. Tread wear, along with other factors, is always measured during training, and it's known that, other variables excluded, the average wear rate under actual race conditions is around one-third less than in practice. Oil and rubber film on the track accounts for this difference. Training for the 1959 (*Continued on page 93*)

STING RAY



by Karl Ludvigsen

The fish-like snout of Bill Mitchell's Corvette-SS-based racing car has been nibbling at the exhaust pipes of some highly esoteric iron lately. It shows what can be done with a careful financial outlay plus a lavish amount of engineering development, time, and driving talent.

► "It's not a four-alarm advance over all existing equipment, but it is basically a good car. Given more than half a chance and some intensive track testing it could compete with the world's best." That's what SCI said in the August, 1957 issue about the Corvette SS, Chevrolet's answer to the 450S Maserati, which caused such excitment at Sebring in '57. Then it seemed that the de Dion-reared, space-framed SS had been sunk by Chevrolet management, foundering in the wake of AMA's racing ban. It seemed that way for two long years, until April 18, 1959, when a brand-new sports-racing machine of startling appearance was decanted from its trailer at Marlboro, Maryland and driven to a fourth overall by Dr. Dick Thompson. It was, as the July, 1959 SCI reported, "The Return of the Corvette SS."

Since that day the SS, reincarnate as the Sting Ray, has adequately proved our point of August, 1957, thanks largely to the longstanding automotive enthusiasm of Bill Mitchell, GM's vice president in charge of styling. Harley Earl, Bill's predecessor in that job, used to say that a good automobile stylist had to have "gasoline in his veins." That's certainly true of Mitchell, who has been keenly interested in competition cars since he found out about them almost thirty years ago. Finally financially able to field a racing team himself, he looked around for suitable equipment – preferably GM-based, of course. His eye fell on the Corvette SS.

To backtrack a bit, recall that Chevrolet designed the sports-racing SS in a dramatic crash program between September and November, 1956, and had completed the first test chassis at the end of the following January. With a rough fiberglass body this became the "Mule", which went down to Sebring for on-the-spot trials while the actual race car was completed. *(Continued overleaf)*

Crisp lines of Sting Ray are a rakish blur at Bridgehampton, where Dick Thompson finished second overall behind Walt Hansgen's Birdcage. GITTENS

©ITTENS

After Sebring the Mule was revised and cleaned up in detail to be exactly like the race SS, but the ax fell on the project before the ex-Mule could be assembled and the planned two-car team prepared for Le Mans. It was this car, the Mule that Fangio and Moss drove in Sebring practice, that Bill Mitchell remembered. Bill was able to take the chassis over, on the obvious condition that it be re-bodied and raced as Mitchell's own private project, divorced completely from GM. This is the way it was done, starting with Bill's own design for the new body, in 1958, and construction of the Sting Ray over the '58-'59 Winter.

THE WHO AND HOW

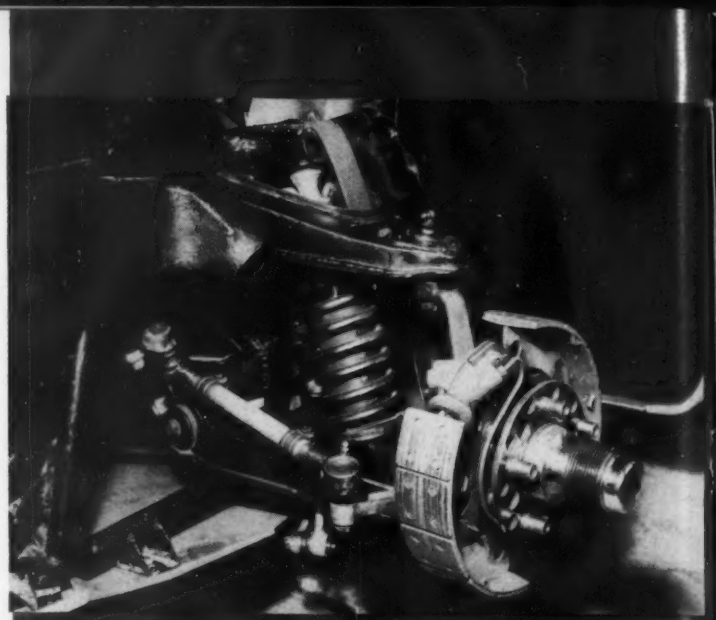
Obviously a lot of the specialized skills of the General Motors Styling Department were utilized in building the superbly-detailed Sting Ray, but all the subsequent racing and maintenance expenses have been entirely Mitchell's. The car is garaged and worked on in a cubicle in the back of the A. J. Berna Company, a woodworking shop in Roseville, Michigan — well east of the GM Tech Center. As of June, 1959, at Elkhart Lake, responsibility for management of the one-car team has been in the hands of Dean Bedford, Jr., a highly canny enthusiast who also supervises the engineering development of the Sting Ray. In 1959 a lot of the mechanical work was done by Eddie Zalucki, but since Nassau of that year R. Ken Eschebach has single-handedly maintained and modified the car. It's a tightly-knit team, closely geared to the needs and preferences of Sting Ray driver Dick Thompson. The number of races that could be entered — hence the pace of development of the car — has been restricted by the limited depth of Bill Mitchell's pocketbook. Nevertheless the Sting Ray's performances in 1959 and 1960 have shown once more that the Corvette SS was at least a match for its contemporaries and would have been no mean competitor today.

When the broad, spatulate Sting Ray body was first created, it was of fiberglass of .125-inch thickness, about the same as on the Corvette. It was reinforced with aluminum, annealed to be soft enough for easy forming; it proved to be too soft to stand up well. After the Road America 500 in 1959, the decision was made to recast the front and rear body sections in lighter fiberglass (.060 inch) before Nassau. This was done by using only three layers of fiberglass silk, reinforced this time with balsa wood! Various hinge and attachment points are of aluminum, heat-treated for strength and bonded in place. This change alone, in just those two sections, saved 75 pounds of weight, and gave the body a flexibility that allows it to "give" when struck instead of cracking and breaking as it did with the heavier thickness.

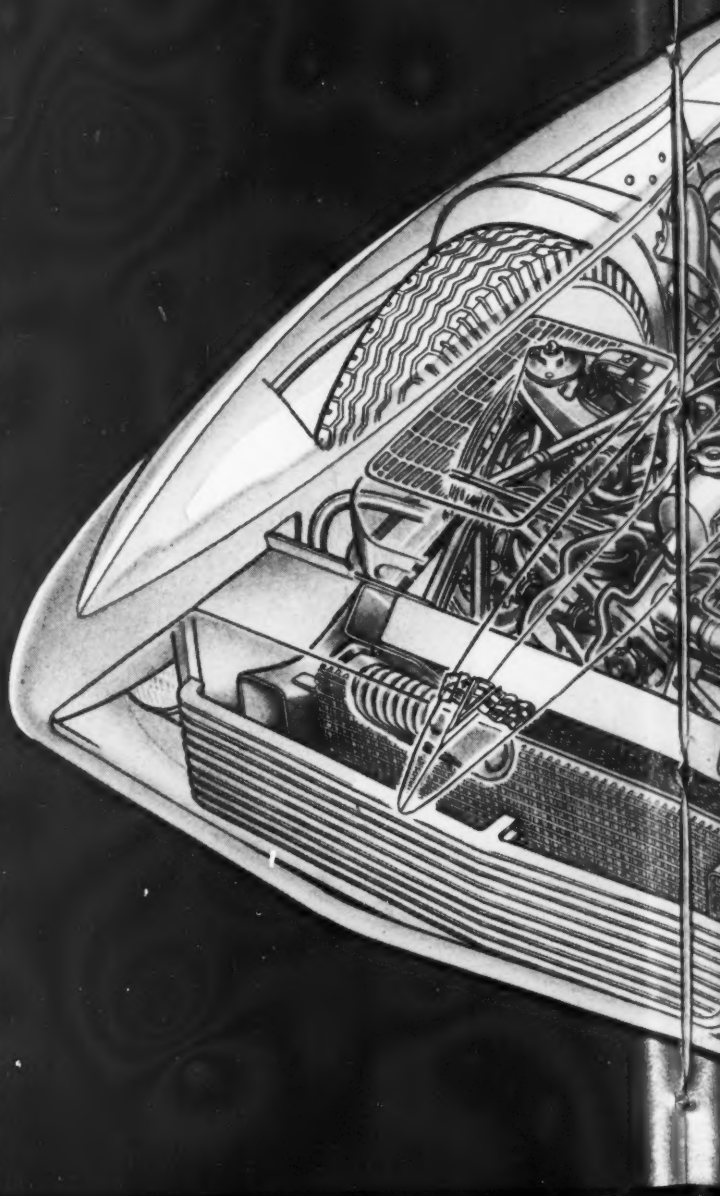
The big up-folding hood section is reinforced by an aluminum box across the nose and by a tube across the cowl that anchors the fasteners and stiffens the hood. Wherever Dzus fasteners are used in conjunction with fiberglass, which is frequently, the 'glass is given only a slightly thicker section around the Dzus screw head. No heads have ever pulled through. With the SS one major problem was heating of the cockpit by the high-flying exhaust piping. The Sting Ray has a less flamboyant pipe layout, more thorough shielding of the pipes, and a firewall insulated by a half-inch layer of Microquartz, a remarkably lightweight insulation held in place by mesh screening.

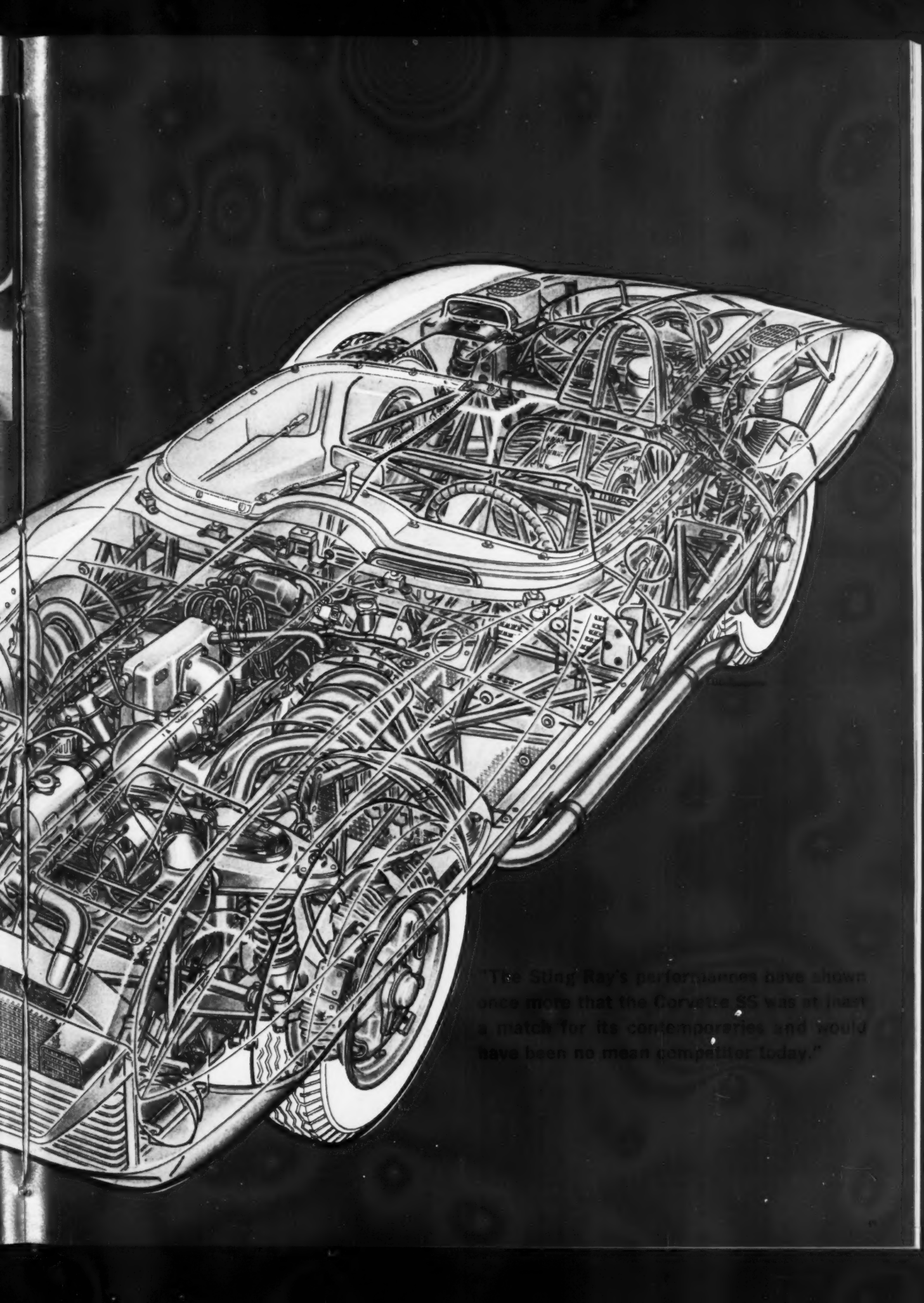
STYLING WITH A REASON

Though the body's shape is obviously styled for visual impact (likely to be as pronounced in the front of the '62 Corvette as it is in the back of the '61, we understand), some aerodynamic principles were under test as well. By making the top of the body relatively flat and deeply bellying the bottom, it was hoped that an inverted-airfoil shape could be created that would press the car more firmly against the road. Tunnel testing, both of a model and of the actual car, has shown a drag coefficient of .43 to .45 (not particularly low) and, (*Continued overleaf*)



Upper suspension arms are specially welded, but the design is suited to stamping. Tubular iron fittings are riveted to this set of shoes.





"The Sting Ray's performances have shown once more that the Corvette SS was at least a match for its contemporaries and would have been no mean competitor today."

in 1959 trim, a certain amount of *lift* that had hampered high-speed cornering through '59. By placing shims above the rear coil springs but not the fronts, the body was given more forward rake and the lift markedly reduced.

When he drove the original SS at Sebring, Piero Taruffi said he thought the springs were too soft all around, causing excessive roll and allowing bottoming over bumps. Following through on this, Dean Bedford shimmed up the springs all around in 1959, then changed to ten-percent-stiffer coils in 1960. This was a big improvement, and another ten percent more stiffness may be tried soon. Delco shocks are used all around, as on the SS, and the front anti-roll bar is exchanged for a lighter bar for racing on very tight tracks, to reduce the car's understeer.

Another Sebring bugaboo was the rubber bushings used in the rear suspension radius rods: these are from the Plymouth front suspension and were not inclined to stay in position back in '57. They still tend to break up under the heavy loadings of competition and are now changed as a matter of course every third race. If the car were to be revised basically for coming seasons, Bedford would consider replacing these bushings with ball joints – but he points out this isn't an easy thing to do. There's too much weight in the Sting Ray's nose for it to handle extremely well, but it still gets around a track with remarkable speed. Of course Dick Thompson is entirely at home in the machine now, and it's genuinely exciting – and a little awe-inspiring – to watch him hurl this car through bumpy, hilly bends like those at Bridgehampton or V.I.R. The much-used word "hairy" was never more applicable!

PROBLEMATIC BRAKING

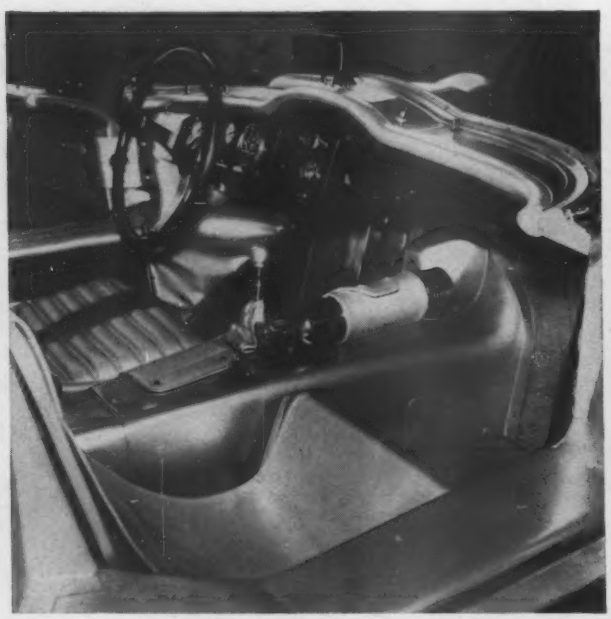
No Sting Ray problem has been more persistent than the brakes. As you'll recall, the SS was equipped with an unique Kelsey-Hayes double-booster system designed to prevent rear brake lockup under high deceleration, using a mercury switch in an involved arrangement of wires and piping described completely in our SS story. One of the '57 problems was too-small line diameters that caused a delay in the system's response; this was rectified then but there still seemed to be a slight lag in the Sting Ray's reaction times, leading to uncontrollable brake lockup – usually at highly critical moments.

At first this lockup was attributed to the combination of the often-erratic cerametallic linings with the Chrysler Center-Plane brake mechanisms that were and are being used, these mechanisms being the two-leading-shoe type which is prone to locking if linings aren't just right. First step, then, was to start using the Moraine sintered-iron linings now fitted to competition Corvettes. Tried first at Lime Rock in July of '59, these linings are used with stock cast iron Corvette drums that are given a fine surface finish and closely matched to the individual linings. At first the sintered linings were riveted in place, then after Bridgehampton in 1960 they were welded to the shoes. During this period the Delco-Moraine Division has experimented with many different sintered iron lining compositions on the Sting Ray, contributing ultimately to the consistency of the Corvette's linings today.

This wasn't the whole answer, though, and the Kelsey-Hayes system was finally thrown out after the Road America 500 in 1959 and replaced by a single Hydrovac booster, modified by Bendix to allow changes in pedal pressure to be made. The brakes are still not very impressive, which leads to a logical question: why not discs? This falls in the category of the ball joints for the rear suspension; it would be nice but it's a very big job, involving extensive changes in the hub layout to keep the discs from causing an excessively high kingpin offset. The Sting Ray's weight is naturally a factor here. With the old body and original brake system, the car weighed 2154 pounds dry, leading to an estimate of a present dry weight of 2000 pounds. Wet, with the 31-gallon normal fuel tank full, it should weigh about 2360 pounds. It's no Birdcage, but neither is it disgracefully heavy.

MODEST POWERPLANT

The Sting Ray's excellent performance in its class (C Modified) is surprising in view of its "cooking" engine, as Stirling Moss described the SS unit at Sebring. In fact the Sting Ray crew doesn't even claim as much power for it as the latest hot production Corvettes are boasting! They say



One look at the Sting Ray's cockpit shows the factory design work in its background. Sling passenger seat meets SCCA requirements. SS problem of toasted driver was solved by re-routing exhaust system and insulation.

THOMS

Sting Ray driver Dick Thompson looks happily expectant while waiting on the grid for a start. His handling of the car against smaller and more agile machinery has provided exciting — if not always successful — racing.

300 genuine horses, as installed, with 280 bhp at the clutch, at about 6200 rpm. Usual rev limit is 6500 rpm, with 6800 okay in top gear. Torque comes to a peak at 44-4500 rpm. This is done with a stock-sized Chev 283 engine, on an 11 to one compression ratio. Dean Bedford and Mitchell have resisted the temptation to "go Scarab" on displacement, feeling that the Chev only becomes less reliable in the process and more demanding of maintenance.

At Sebring the Corvette SS used the prototype aluminum cylinder heads, without valve seat inserts. These heads have been used on the Sting Ray, as have aluminum heads *with* inserts. Both work with equal high efficiency and reliability on this carefully-maintained car. Between the heads a 1957 Rochester fuel injector continues to supply fuel-air mix, set a shade on the rich side to keep the engine running cool. The normal racing fuel consumption is about 6 miles per gallon; a supplementary tank that brings the capacity to 45 gallons is used for the Road America 500.

Down below, the 30-weight Shell X100 oil is kept under control by a baffle with a little swinging trap door in the oil pan, and by a remarkable Dow-Corning anti-foam additive ("200 Fluid") which absolutely eliminates bubbles in the oil. The bypass-type oil cooler, mounted ahead of the radiator to the right, is an experimental Harrison unit designed for a truck transmission. It's sensitive to the oil viscosity (when the oil gets thin it passes more of it) in such a way that it keeps the lubricant at virtually constant temperature – 240 degrees in this case – without a thermostat. Total capacity of the oil system is 7 quarts.

REFINED ACCESSORIES

A 1960 Corvette aluminum radiator, suitably modified regarding fillers and pipes, handles the cooling job perfectly. It has to be angled well forward to fit under the low hood, which makes it possible to duct the exit air up and out in a most interesting way. Actually only a third of the air goes out through the two grilles in the hood, the rest flowing back through the engine room to keep the compartment cool. A 180-degree thermostat is used, and the aluminum water pump is driven at .7 instead of .9 engine speed in view of the consistently high revs used.

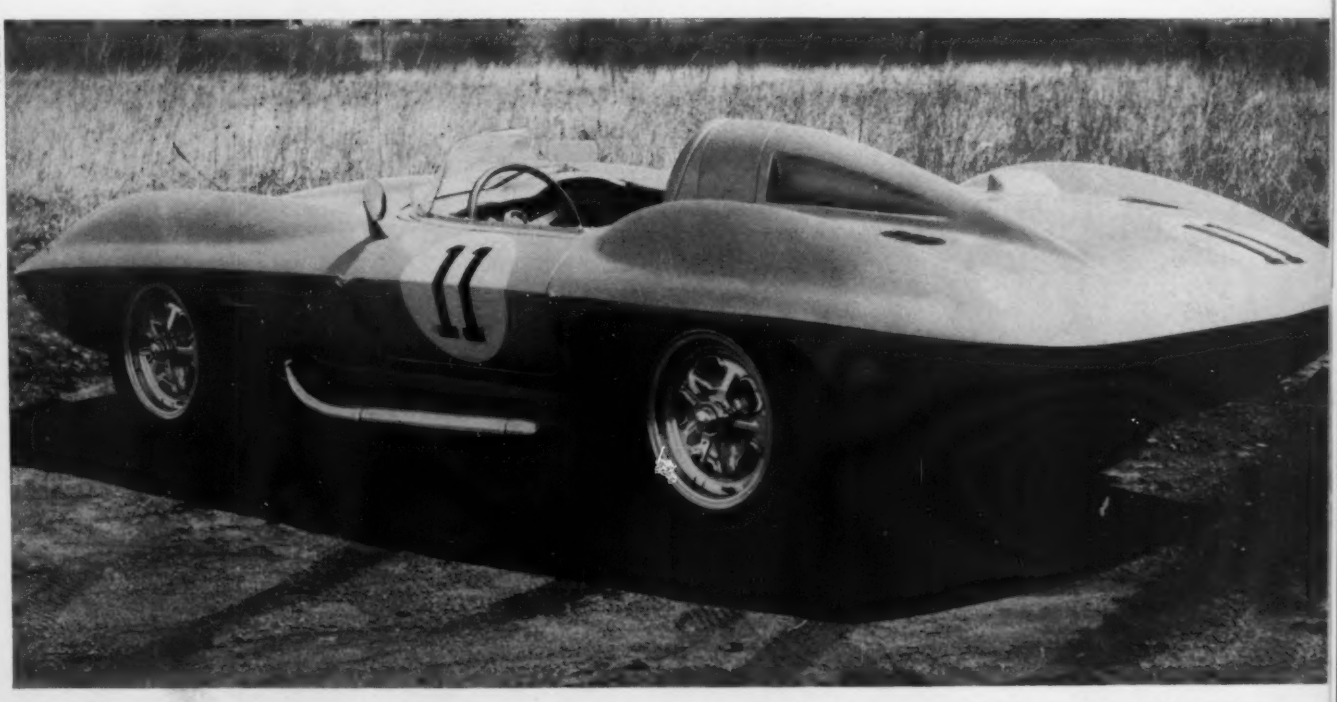
A standard Corvette clutch transmits the power, but it has to be a "good" one. The four-speed box has an aluminum case, experimental in 1957 but now standard on Corvettes, possibly by virtue of its trial by fire in the Sting Ray. At the back is a Halibrand center section termed "intermediate-size" – probably the V8-type unit after it was beefed up to double its capacity. At any rate when the SS was built Chevy bought the raw castings and machined them to take its own side plates and ring and pinion. In use on the Sting Ray, the bearings in this unit have to be changed every 1500 racing and practice miles, to be on the safe side, indicating that it's definitely overstressed in this application. Dean Bedford makes a keen point here: "The SS Corvette design was adequate for Sebring but would never have finished Le Mans."

A Powr-Lok limited-slip differential is used. Naturally a wide selection of ratios is at hand, beginning with the 3.55 that was fitted to the SS at Sebring. This isn't usable on the Sting Ray on U.S. tracks, and Bedford feels that for the Florida track he'd choose 3.70 today – the cogs they use for Bridgehampton and Meadowdale, where the car reaches about 155 mph. For Danville and Road America 3.86 gears are used, 4.20 for Cumberland and 4.39 for Marlboro. These can of course be matched with the tire sizes chosen for the 5½K x 15 Halibrand rims. Usually Firestone 6.70 x 15 is worn at the front and 7.10 x 15 at the back, though the smaller sizes can be fitted all around for tight tracks like Cumberland and Marlboro.

PROVED ITS POINT

Certainly Bill Mitchell's exciting Sting Ray has proved a strong point on behalf of the Corvette SS, with some excellent racing performances, especially in view of the time that's passed since the design was laid down. Where's the SS today? It's something of an old warhorse around Chevrolet Engineering, its very fragile magnesium body held together by rivets and baling wire. From the competition standpoint, its promise has now been amply fulfilled by its alter ego. Now we look forward to seeing more of the experience gained with these cars employed in the Corvettes of the future. *–KEL*

WHEELER



The Sting Ray body may provide design ideas for future production Corvettes. Recently car was raised in the rear to kill lifting tendency at high speed.

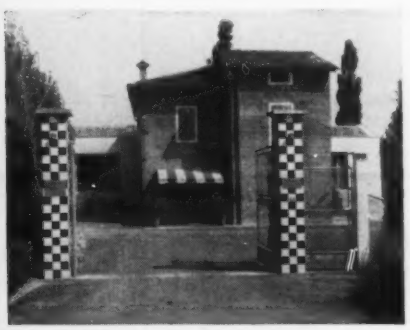
TWENTY HOURS WITH A CHAMPION

by Anne Burke Johnstone/Behind a smile, a quietly successful master of his trade imparts twenty hours of technique and knowledge, some of it foxy, some of it grim, in the gentle art of motor racing.

► "Know your car," emphasizes virile, silver-haired, smiling Piero Taruffi.

Repeating in three languages for the benefit of his three students — American, French, and Italian — he settles himself behind the wheel of a Maserati A6GCS belonging to the Centro Sud Drivers' School. Pointing out how to be comfortable and relaxed while driving any racing car, he demonstrates the correct seating position.

So begins the first half-hour theory lesson of a one-week course designed to "increase the skill of young sportsmen" interested in motor racing.



"Through these portals. . .". The calm Italian-villa look of the Centro Sud school belies the practicality and purpose of its student-drivers.

At left, a student is briefed before his final high-speed solo. But it can't tell you how to feel you've done this dozens of times before.

The school is probably the best of its kind. It was begun several years ago with Louis Chiron, the French ace, as its first instructor. Since then the cost has been lowered from five hundred dollars per week to three hundred and twenty. Contracts with Dunlop for tires and BP for oil made possible such a substantial reduction. Not included in the cost is a fifty-dollar matriculation fee which automatically makes the student a member of the Centro Sud club, allowing him use of the modern showers, reading room and TV.

For this first lesson, in the lower level of Centro Sud's immaculate workshop, Piero Taruffi, retired Italian champion, focuses attention on basics: shifting, the advantages of heel-and-toeing and holding the steering wheel correctly. "It is only practical to hold the steering wheel in the best way," he advises, a twinkle in the steady brown eyes. "That means maintaining the best control with the longest driver endurance — so that the car can be handled *well* for hours."

After completely going over the automobile's controls, the students prepare for the first driving lesson on the Modena Aeroautodrome. Each student will be given a half-hour of individual instruction by Taruffi in one of the school's two Maserati two-liters.

The Modena Aeroautodrome, about two blocks from Centro Sud, is a 1.2-mile course with a chicane, a fast bend, a ninety-degree turn and a tricky, deceiving fast turn entering the pit straight. Here a driver may overcook it and see the pits, usually so populated, empty like the sea when something alarms the fish.

Each student, who no doubt is busy swallowing a lump in his throat, is given five "orientation" laps. First Taruffi demonstrates, explaining at each turn what he is doing. Then the student takes over after being told to use only "seventy percent of the limit" and to concentrate on cutting the correct line through each turn. If a student has raced before, Mr. Taruffi may let him climb into the driver's seat first, correcting mistakes or complimenting as they tour the course.

One thing nervous students simply have to adjust to is the passing roar of an odd Stanguellini Formula Junior along with Phil Hill in a Formula 1 Ferrari. Most of the time it is impossible to have the Modena course exclusively, except maybe early in the morning.

At 7:30 p.m., grubby but relieved after the driving lesson, the students enter the checkered-flag gateposts of Centro Sud with Mr. Taruffi and continue to the classroom and its black-

(*Continued on page 80*)

Higher Learning for Higher Speeds

by Jesse Alexander

One good way to prepare for that first race or big-time rally is to attend a driver's school. After sitting in on a Centro-Sud class, run through the schools listed here and decide which one suits you.

► Two kinds of driver training are currently available in Europe: first, the out-and-out racing driver school, seriously aimed at developing fresh talent for Formula racing, and second, the informal, weekend type of "school" that is typified by the Swiss-organized S.A.R. *Ausbildungskurs fur Rennfahrer*, or the Scuderia Hanseat course held on the Nurburgring.

From the chart, you should be able to decide which is your school. The Cooper school, for instance, is a dead-serious attempt to find new drivers for Cooper racing cars and students must pass a preliminary test on a detuned 1.5-liter Cooper single-seater at Brands Hatch before being allowed to continue. This and Geoffrey Clarke's Motor Racing Stables school have no time to waste and should not be considered if you merely want to have fun on a spare weekend while touring Europe.

I have attended the Swiss course of instruction twice now and enthusiastically recommend it to anyone interested in finding out their limitations and having fun on an interesting circuit like Montlhery. Language is no problem and everyone participating has a ball. I remember one fellow last year at Montlhery who drove his Peugeot 403 at the Swiss school, and on the following weekend he turned up at the Nurburgring taking part in the Scuderia Hanseat school.

Instructor with Scuderia Hanseat, Richard von Frankenberg, prefers to call his program a "style school" and not at all a school for racing drivers – he points out that very often it's the slowest participants who glean the most out of the Nurburgring sessions, two of which are held each year, one in the Spring, one in the Fall.

Everyone is quick to agree that if you have ideas about becoming a racing driver, there's no substitute for actual participation in races. The only thing these schools can do is prevent you from making too big an ass out of yourself on that first competitive fling.

Name of School	When Founded	Sponsors	Location	Type of Training	Time Needed	Driving
Swiss Racing Driver's School	1948	Swiss Auto Racing Club Automobile Club of Switzerland	Montlhery	Slalom, fast and slow corners, in practice and theory	Three days	Paul F Olivier
Fahrer-Ausbildungslehrgange der Scuderia Hanseat	1958	Scuderia Hanseat	Nurburgring	For advanced beginner who wants to improve his style	Three-four days	Wolfga Paul Hans S
Cooper Racing Driver Training Division	1958	Cooper Car Company	Brands Hatch	Serious training program for drivers interested in Formula racing	No time limit	Bruce Ron N
Motor Racing Stables Limited	1959	Rob Walker Ken Gregory Geoffrey Clarke	Finmere Circuit	Serious training program for drivers interested in Formula racing	No time limit	Stirlin Tony
Scuderia Centro-Sud Driver's School	1957	Scuderia Centro-Sud	Modena Autodrome	Serious training program for drivers interested in all types of racing	Five days	Piero

ZELLER

Three students of the Swiss Racing Driver's School study a fourth as he takes his MGA through one of the banked turns at the Montlhery circuit.

Driving Instructors	Types of Vehicles	Cost	Insurance	Contact	Next Session
Paul Frere, Willy Daetwyler, Olivier Gendebien, Michel May	Student's own car	$71 hotel included	Liability included in fee	Dr. K. Schaffer SAR, Post Box 1266 Bern-Transit Switzerland	April
Wolfgang von Trips, Edgar Barth, Paul Frere, Hans Herrmann, Hans Stuck, Richard von Frankenberg	Student's own car	$65 hotel, fuel and food included	Up to the individual	Secretary Herr Humer c/o Scuderia Hanseat Harvestehuder weg 78a Hamburg, Germany	April
Bruce McLaren, Ian Burgess, Ron Moore	Cooper F.2 (detuned 1.5)	Registration fee is $15. If student is up to Cooper standards he is invited back for free training.	Up to the individual	Mr. A. Ferguson Cooper Car Co. Surbiton/Surrey England	April
Stirling Moss, Jack Fairman, Tony Marsh, Peter Pilsworth	Lotus F. Jr., Cooper F. Jr., Lotus Eleven, Cooper Sports, Lotus Seven	Registration and examination fee is $15. If the student is accepted the student must pay an enrollment fee of $30 plus a $1.30 charge for each lap driven.	Liability included in fee	Mr. Geoffrey Clarke Motor Racing Stables Ltd. Tingewick, Buckingham, England	April
Piero Taruffi	250F Maserati, A6G Maserati, 300S Maserati, 1100-1500 OSCA	Registration fee is $50. Ten lessons, using school cars, $322. —using student's car $129. Individual one-hour lesson with school car is $43.	Up to the individual	Mr. Guglielmo Dei Modena Via Emilia Ovest 646 Italy	April

HERALD-CLIMAX

► SCI is not alone in having suggested (August, 1960) a Climax engine for the nimble little Triumph Herald. But who would be more likely to accomplish this than a Triumph dealer better known for his championship driving in Climax-powered Coopers? Jack Brabham is indeed the man. Jack did the conversion on his personal car for his own amusement. It was so successful he's decided to make a business of it. The complete cars are to be available here through Warren Olson in Los Angeles, the Standard-Triumph firm looking on askance (and, we suspect, a bit jealously).

With an engine swap of this type, it might seem logical to fit disc brakes, special suspension and close-ratio gears, finishing up with a very desirable but extremely expensive motor car. Jack Brabham can supply all these items, but the car provided for test (and SCI was the first magazine to try it) has only the basic conversion: twin-carburetor Climax engine, special clutch, hard brake linings and oversize 5.60 x 13 tires. Outwardly, it looked completely standard, a fact which was to worry quite a number of high-performance-car owners during the course of our test.

The Brabham Herald has 66 percent more power available than the production coupe, so it can be deduced that its performance will be in an entirely different class. What is surprising is that the Climax is smoother, quieter, much more flexible, and uses very litle more fuel than the 948 cc Triumph unit.

In terms of straight-line performance, the Herald-Climax is nearly twice as fast to 60 and over 20 mph faster flat-out. The standard wide-ratio gears give very rapid initial acceleration, but as the maximum speeds in the lower gears are 24 and 41 mph, respectively (same as with the high-revving Triumph engine), these ratios are rarely used once the car is under way. The big gap between second and third also discourages brutally quick upshifts across the gate.

Wheel spin is easily provoked from a standing start, the inside edges of the rear tires leaving two narrow black lines as the swing-axle rear suspension bows under hard acceleration. The outside edges of the outside tires leave similar marks when you corner right on the limit, but only at these extremes does the car give any indication of being hard-pressed to absorb the extra power. Driven more normally, it handles like a good sports car, its oversize tires providing a good grip on both wet and dry surfaces. A four psi differential between front and rear tire pressures seems to provide the most satisfactory handling characteristics on this car. On English by-roads, it covers the ground deceptively quickly, taking all but the sharpest bends in top gear, leaning very little and riding smoothly on surfaces of all types. It climbs almost all main road hills in top gear, and cruises at over 90 mph on the M1 motorway without any drop in oil pressure or rise in water temperature. Whatever the conditions, in fact, the engine gives the impression that it is just loafing along, with more power available whenever it's needed. Experience with the Climax FWE engine suggests that there is little danger of it wearing out any faster than — or even as quickly as — the production Triumph unit.

The brakes, with their special Mintex M20 linings, provide adequate retardation with moderate pedal pressures, and show no tendency to fade after repeated use. A special 8-inch clutch ensures that snap gearshifts can be made without slip, but clutch action is so gentle that even ladies weaned on automatic transmissions can drive the Herald-Climax without qualms.

The only departure from standard instrumentation on Jack Brabham's Herald is the fitting of a combined oil pressure/water temperature gauge. A Speedwell electronic tachometer was used for testing and is recommended to prospective owners.

World Champion Jack Brabham surveys the Coventry Climax-powered Herald. The overhead-cam engine fitted neatly and gave a big performance boost.

The chief limitation to its performance is the Herald's body shape, which begins to have a major influence at speeds above 70 mph. An interesting comparison can be made with the Lotus Elite which, fitted with a similar twin-carburetor Climax engine, is very little quicker than the Brabham Herald from rest to 70 mph or over a standing-start quarter-mile, but has a maximum speed over 20 mph higher. The difference in aerodynamic efficiency is also shown in fuel consumption figures, the Elite having an overall advantage of about 5 mpg. Offsetting this, the Lotus is considerably more expensive.

The Herald coupe is, to all intents and purposes, a two-seater with space for a vast amount of luggage or two small children, the slant of the rear windows scarcely leaving headroom for adults in the rear seats. It would, however, be perfectly practical to put a Climax engine in the convertible or sedan Heralds, although in the latter case it would be best to fit the 4.55 to one final-drive ratio. Both cars can be expected to have much the same performance as the coupe, and very similar handling.

Vast performance increases are rarely bought for money alone. If the car's original engine is suitably breathed upon, it usually becomes crankily temperamental and often short-lived. If a more powerful engine is installed, extra weight on the front wheels usually ruins the car's handling. The Herald-Climax, by virtue of using a race-proved but extremely tractable engine made largely of aluminum, actually weighs 70 pounds less than before though displacement is up by 28 percent and power by 66 percent. It's not possible to tune the 948 cc o.h.v. Triumph engine to provide performance comparable with that of the 1216 cc o.h.c. Climax. Even if it were, the hopping-up would be more expensive than the engine swap — witness the current price of good Formula Junior engines. The Brabham Herald has all the handling advantages of a souped-up car with none of the snags of unreliability and shortened engine life. Combining much of the performance and flexibility of a big American engine with the size, handling and parkability of a small import, it's an extremely attractive proposition. —*David Phipps*

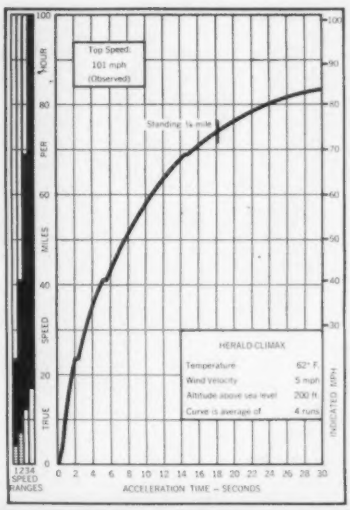
ROAD TEST

HERALD-CLIMAX Coupe

Price as tested: Approx: $3600

Importer:

Warren Olson
631 N. Robertson Blvd.
Los Angeles 36, Calif.



ENGINE: (Coventry Climax FWE)

Displacement	74¼ cu in, 1216 cc
Dimensions	Four cyl, 3.00 x 2.62 in
Valve gear: single overhead camshaft, parallel valves inclined 21°	
Compression Ratio	10.0 to one
Power (SAE)	83 bhp @ 6400 rpm
Torque	74 lb-ft @ 4800 rpm
Usable range of engine speeds	800-6700 rpm
Corrected piston speed at 6400 rpm	2990 fpm
Fuel Recommended	Super premium
Mileage	22-29 mpg
Range on 8.4 gallon tank	185-245 miles

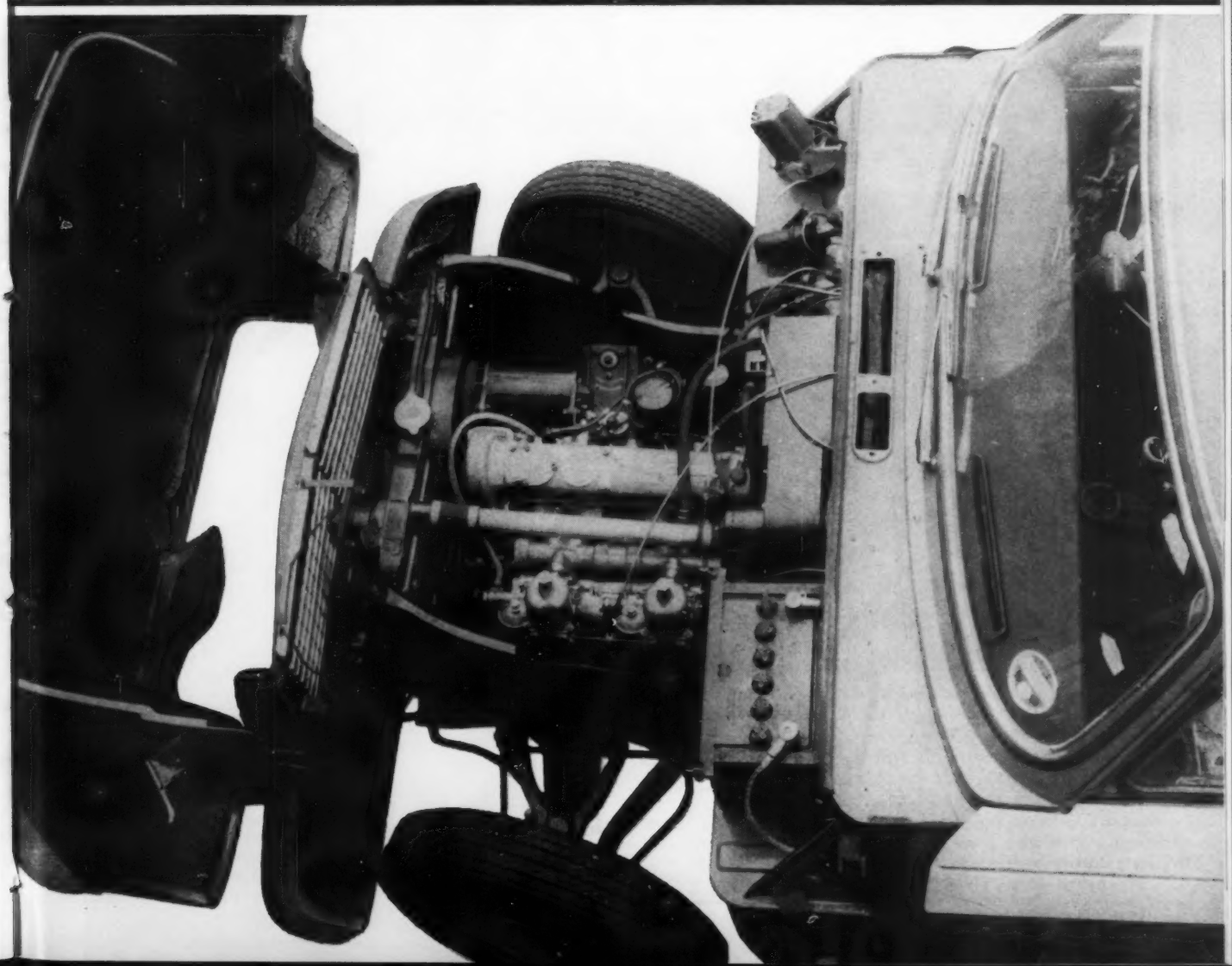
CHASSIS: (Triumph Herald with oversize tires)

Wheelbase	91.5 in
Tread	48.0 in
Length	153.0 in
Ground clearance	7.0 in
Suspension: F, ind., coil, wishbones, anti-roll bar; R, ind., swing axle, leaf spring.	
Turns lock to lock	3.6
Turning circle between curbs	25½ ft
Tire and rim size	5.60 x 13, 3½ x 13
Pressures recommended	20/24 psi
Brakes, type, swept area: drum, F8, R7 in; 122 sq in	
Curb Weight (full tank)	1650 lbs
Percentage on Driving Wheels	51%
Test Weight	1980 lbs

DRIVE TRAIN:

Gear	Synchro?	Ratio	Step	Overall	Mph per 1000 rpm
Rev	No	4.27		19.44	3.5
1st	No	4.27	74%	19.44	3.5
2nd	Yes	2.46	69%	11.20	6.1
3rd	Yes	1.45	45%	6.62	10.3
4th	Yes	1.00		4.55	15.0

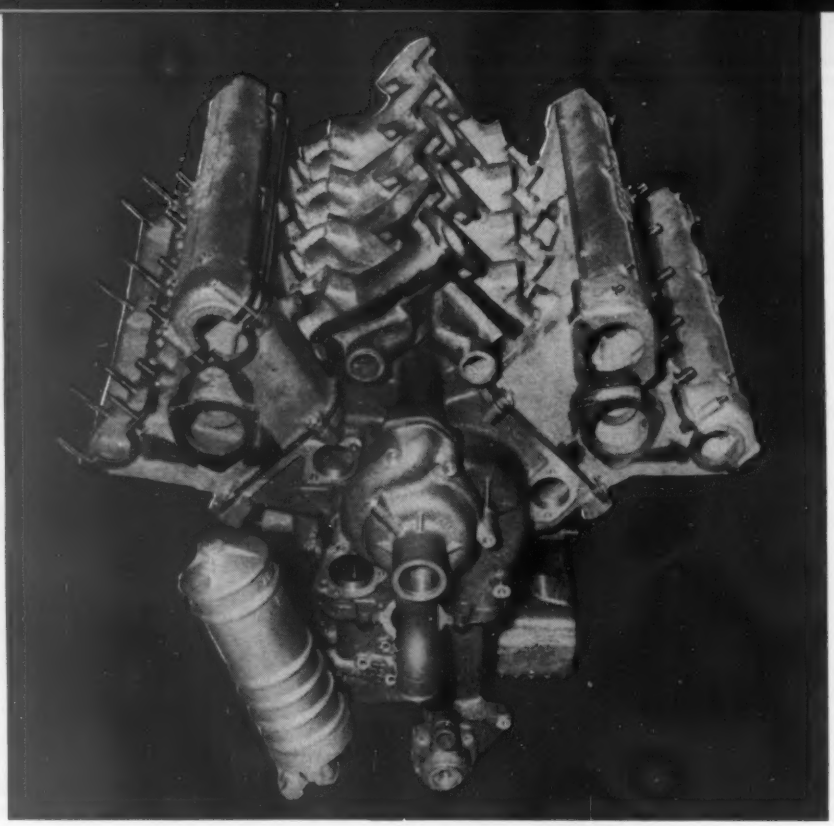
Final Drive Ratio: 4.55 to one.

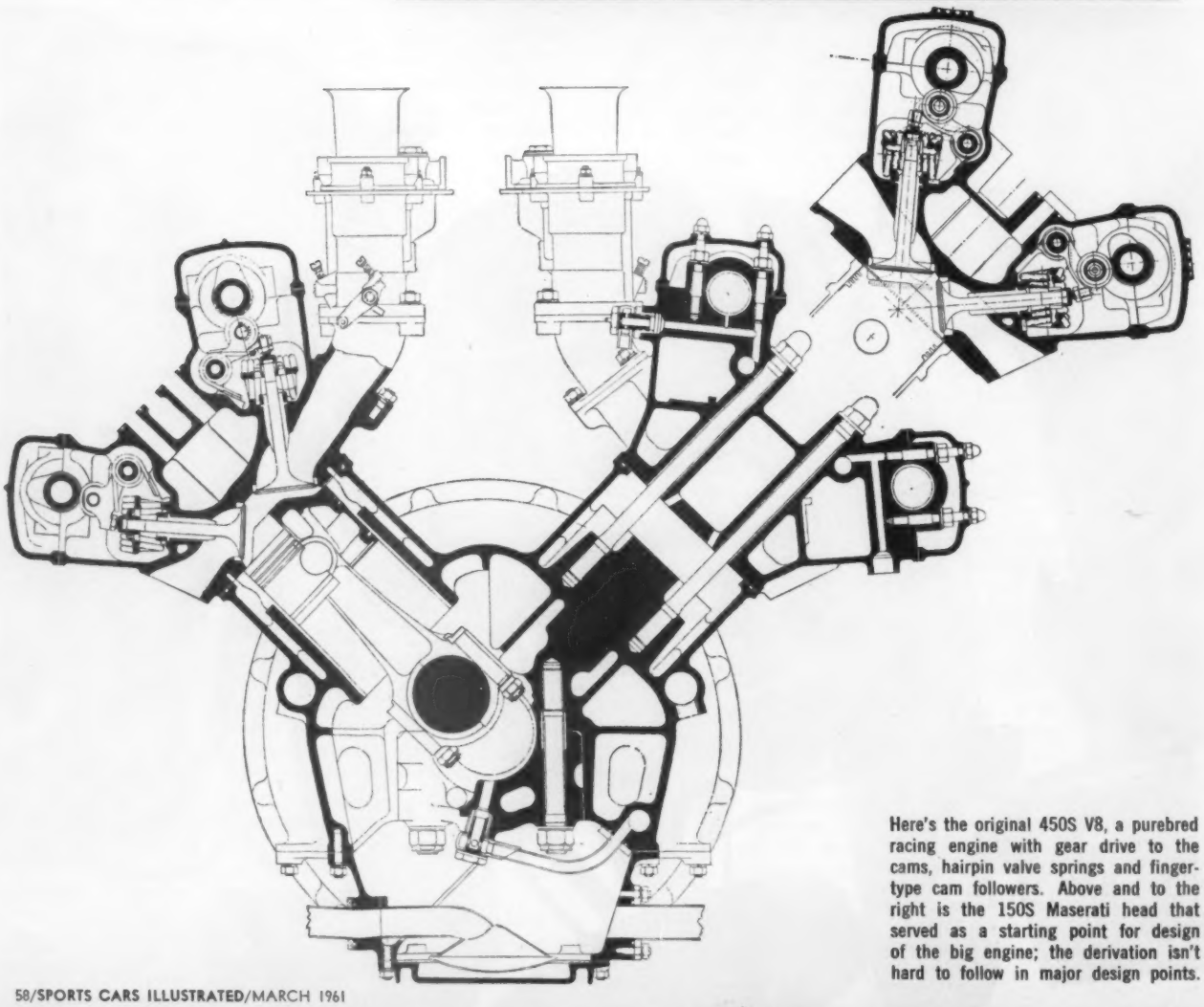


Few sports car engines have held the fascination and excitement of Maserati's 450S V8, one of the most potent powerplants of recent years in one of the most wicked-looking cars. Sadly the

BIG BENT-EIGHT

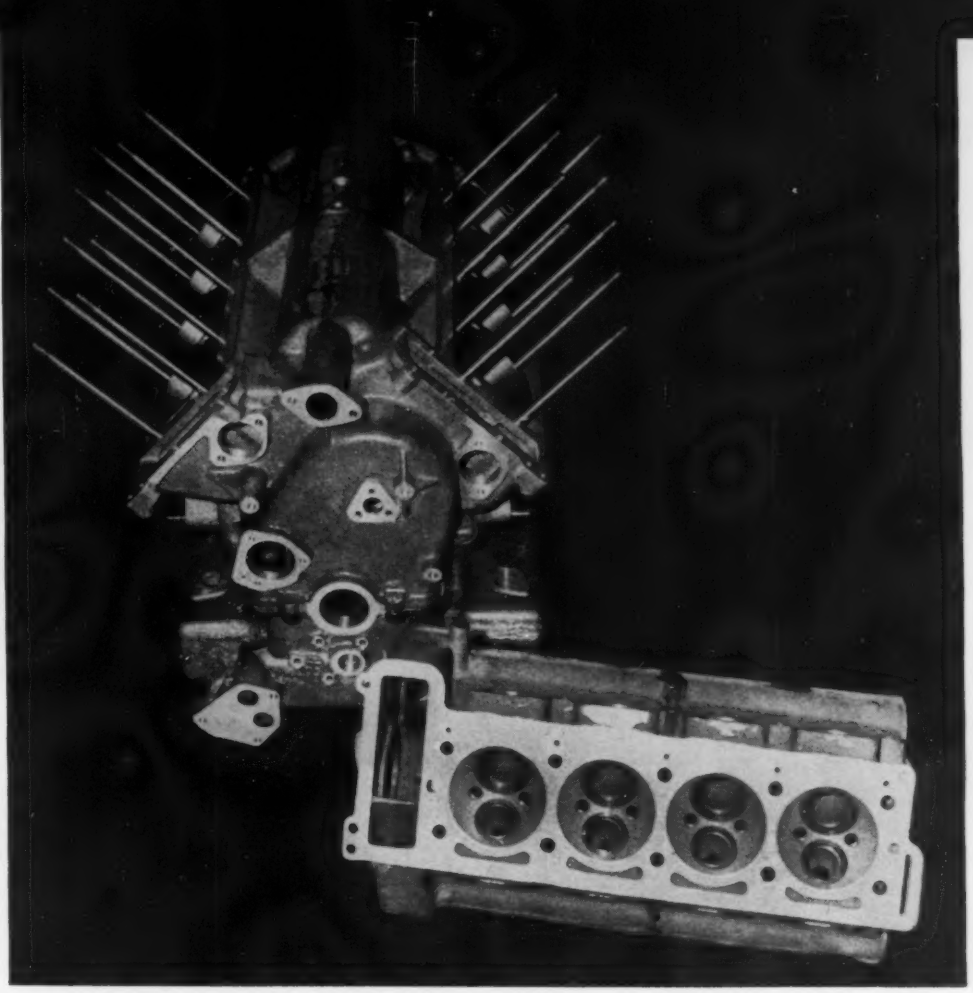
was much too complex to build in quantity, as the Orsis planned last year, so they've produced an all-new five-liter engine that's 110 pounds lighter than the elaborate racing engine. The new one should give the Maser 5000GT all the power of its predecessor at about half the cost and complication.

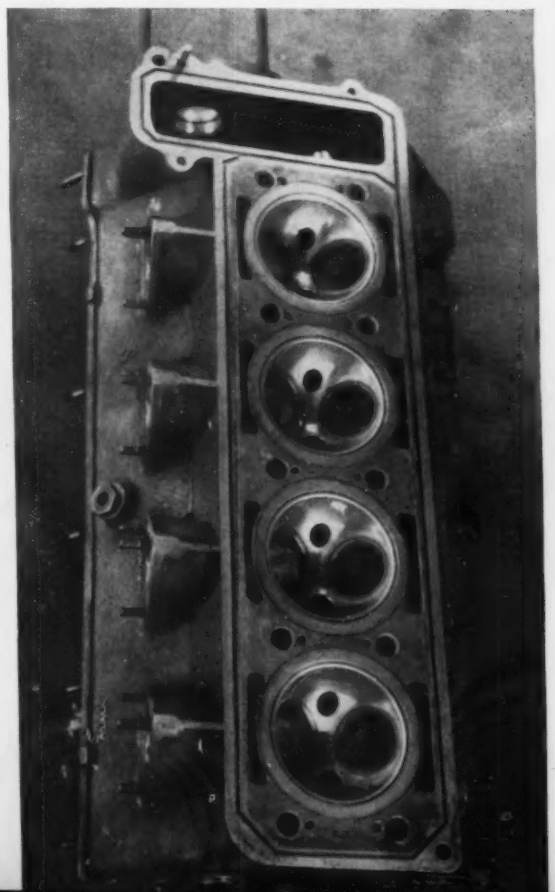


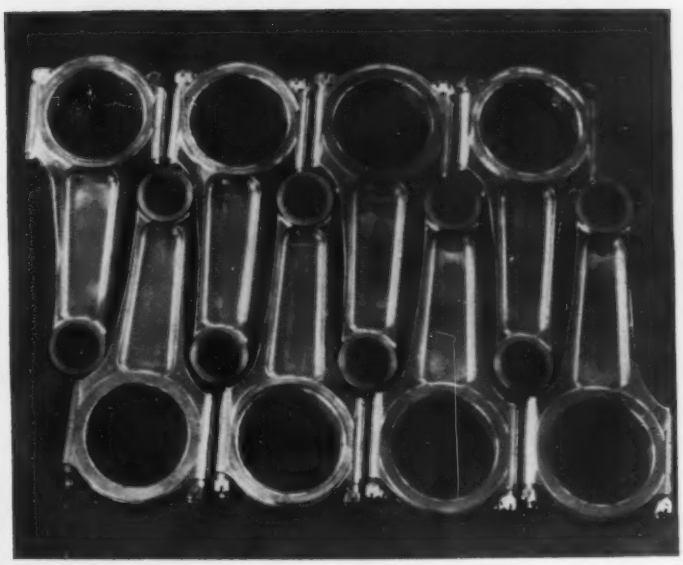


Here's the original 450S V8, a purebred racing engine with gear drive to the cams, hairpin valve springs and finger-type cam followers. Above and to the right is the 150S Maserati head that served as a starting point for design of the big engine; the derivation isn't hard to follow in major design points.

At left and right is the latest 5000GT Maserati V8, photographed by Jesse Alexander while it was being built up before the Turin motor show. Bore and stroke are now 94 x 89 mm, against the old five-liter dimensions of 98.5 x 81 mm. Drastic simplification includes wet instead of dry sump oil system, chain instead of gear drive to the cams, cup-type tappets in place of the fingers, and complete integration of the Lucas fuel injection system. A magnesium oil pan, plus these changes, lightened the engine by 110 pounds. Warm water emerges from the cylinder heads through manifolds cast integral with the fuel injection ram tubes, at left, which serves to warm and vaporize the incoming mixture in this engine intended exclusively for touring.







These superbly forged, machined and hand-finished connecting rods were used in the 450S, which had dimensions of 93.8 x 81 mm. It's likely the rods in the new 5000GT will be similarly shaped, to make use of the same forging dies, if not finished to the same high gloss to minimize all surface "stress raisers."

Cylinder head at left, from 450S, can be compared with new 5000GT head at top of page. One above is from right-hand bank; this one is from left-hand side. Its big intake ports, with three-stud mountings for short pipes to carbs, are on the left. Old and new engines are alike in featuring dual ignition (two plugs per cylinder) with distributors now driven by the camshaft chain system.

Road Research Report: PONTIAC Tempest

► Pontiac's reputation as the "hot one" among General Motors' divisions made it the company to watch when the new second-generation compacts were introduced; certainly no one was disappointed. The Tempest's specification was revolutionary for this country and was completely new on an international scale in three respects: 1. combination of an engine in front with an automatic transmission in the rear (certainly the DAF doesn't conflict here) ; 2. use of a curved drive shaft, and 3. mounting of an engine-transaxle assembly as a single unit, with engine and transaxle at opposite ends of the automobile.

Both in the United States and overseas, following the Tempest's introduction at the Paris motor show, interest in the car was unusually high and skepticism regarding the curved drive shaft was almost universal. Certainly this doubt wasn't allayed by the two months that elapsed between first disclosure of the Tempest's features and actual delivery of the cars. Because of this interest and because of our own curiosity about this remarkable car, SCI put it high on the Road Research Report priority list. Our remarks are based on experience with two Tempest sedans: one with power steering, automatic transmission and the four-barrel four, the other with normal steering, standard shift and the two-barrel four. The first was driven over 2200 miles, the second 1500. Since the V8-powered cars are rare birds (no more than 10 to 15 percent of production) we decided to concentrate on the fours for this Report.

PRACTICAL ORIGIN

What were Pontiac's goals in the design of the Tempest? We can't be certain, but we can make an educated guess. First, the price had to be low — a handful of dollars more than the Corvair, but no more. Second, there had to be a brand-new engineering feature, comparable to the Corvair's rear engine, to distinguish Tempest from its bigger brethren in a way that would build bonus business for Pontiac. Third, there had to be ample interior room in spite of the planned reduction in exterior dimensions.

The new engineering feature was supplied by independent rear suspension with a transaxle, mated with an engine up front. By virtue of the new era of interdivisional co-operation at G.M., Corvair components could be used to build a transaxle at modest cost and supply an independent rear suspension (and front suspension as well). Use of this layout already meant that the floor tunnel could be greatly reduced in size, but to reduce

it as much as possible – and thus provide the desired interior room – the decision was made to utilize an exclusive Pontiac design idea that had been in the experimental stage for some time: the curved drive shaft. The point must be made here that this shaft could not possibly be used as a selling point for Tempest in any significant way; thus its use had to be based on engineering considerations alone. Only indirectly does it provide a sales point by lowering the floor line.

Extra money clearly had to be budgeted for the transaxle and curved shaft and, in addition, for the vastly-revised body shell and trim that has to cost more than the Corvair's simpler body. Keeping the cost target in mind, the remaining funds certainly wouldn't allow any experimentation in the engine room, at least not on the scale Chevy indulged in for the Corvair. Tempest's "leaning four", just half the Division's big V8, was the result. In the final design, the wide-based engine-transaxle mounting demanded by the curved shaft's rigid housing matches perfectly the needs of the big four-cylinder engine. The whole package is a logical one; whether the chicken or egg came first isn't important now. We do feel, though, that independent rear suspension and rear-mounted gearbox were features *sought* by Pontiac, while the curved shaft and four-cylinder engine were *accepted* to gain these and other features, within a strict price framework. The final base price of the Tempest is $193 more than the Corvair and $217 less than the Buick Special and Olds F-85.

EXTERIOR IMPRESSIONS

The first thing about the Tempest that impressed us was its pleasantly clean body. The old jello-mold school of design has gone, and is replaced by a school that seems to acknowledge that there is a basic automotive shape that needs only intelligent embellishment, not irrational elaboration. The crisp lines of G.M.'s senior compacts are as effective as anything done in Italy in recent years. A distinctive grille leaves no doubt that this car is a Pontiac. Generous credit is owed the designers for establishing a grille design that identifies a brand so boldly yet tastefully. That's not easy to do these days, but Pontiac has done it well. The scooped-out fender treatment offends those who expect a rear warm-air exhaust, but general opinion is that it very effectively matches the handsomely large wheels.

There's really room for six inside the Tempest and a roomy trunk is incorporated without a bulge or big fins to conceal it. One styling inconsistency does occur at the rear, where the very simple tail-lights seem out of place in an elaborately-sculptured area.

ROOMY INTERIOR

The Tempest's cockpit is pleasantly and noticeably roomier and easier to get in and out of than the Corvair's. Key dimensions which are larger are: doorway height (1¾″), seat cushion to door post clearance (1½″), legroom (2″), and headroom (1″). The squared-off shape of the rear door opening makes it much easier to get into, compared to the triangulated opening on the Chevy compact.

One inconvenience is that the keyhole is hard to get at. It is below the door handle as usual, but the highly-contoured styling moves it inboard so much that you have to stoop over to see it.

While the width of the Tempest is not outstanding, the elimination of the drive-shaft hump makes it more comfortable for three-abreast seating than so called "full-sized" cars. This feeling of interior space makes it hard to remember that this is a smaller-than-usual American car. But it is, which can be very useful when insinuating yourself through a traffic jam.

Armrests are standard on the front doors and we found them hard but useful. The bench seats are quite ordinary, perhaps a bit on the firm side. They sit nearly two inches higher off the floor than in a Corvair, which effects a worthy improvement in the driving position.

Armrests for the rear doors are part of the deluxe interior accessory package. They have integral ashtrays which gives the Tempest some of the luxurious air associated with the senior Pontiacs. Also in this package is a floor mat with a Persian-lamb-like center section over the modest central ridge; the upholstery becomes much more durable-looking, though more ostentatious. The vinyl sheeting is embossed with bold patterns and has broad white bars incorporated, indicating center lines for the six passengers. The standard seat coverings looked much more attractive to us, yet gave the impression they wouldn't clean as easily.

THE REMARKABLE SHAFT

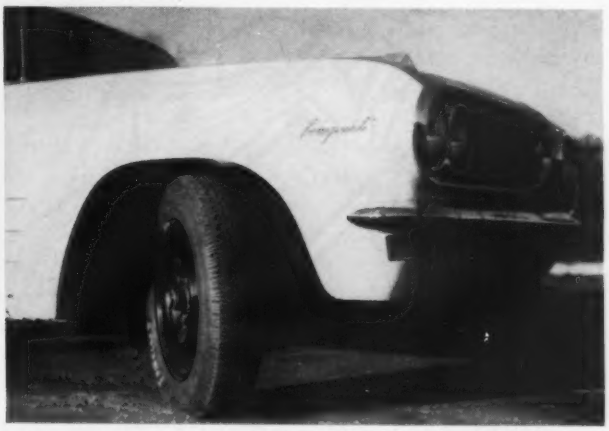
Our introductory story on the Tempest (October, 1960) dealt in detail with the curved drive shaft that made so much of this roominess possible, and we'd refer you to that for a general description and cutaway drawing. Some additional data on the shaft and its installation might be pertinent here, however. To combine flexibility with strength in the proper proportion, the shaft is forged of SAE 8660 steel (high nickel, chrome and molybdenum alloying percentages) to torsion bar specifications. For the automatic-box cars, the shaft is 0.65 inch in diameter and 87¼ inches long, while the manual-box shaft is 0.75 by 82 inches. 100 percent inspection is practiced, every single shaft being Magnafluxed for surface and sub-surface imperfections before shot-peening and the final straightening operation. The latter is in three stages, the final one bringing the total indicated runout down to a maximum of 0.020 inch at the center and less at the ends. That's pretty straight! Surface smoothness is held to ten to twenty millionths of an inch.

(Text continued on page 86; data overleaf)

PHOTOGRAPHY: GITTENS

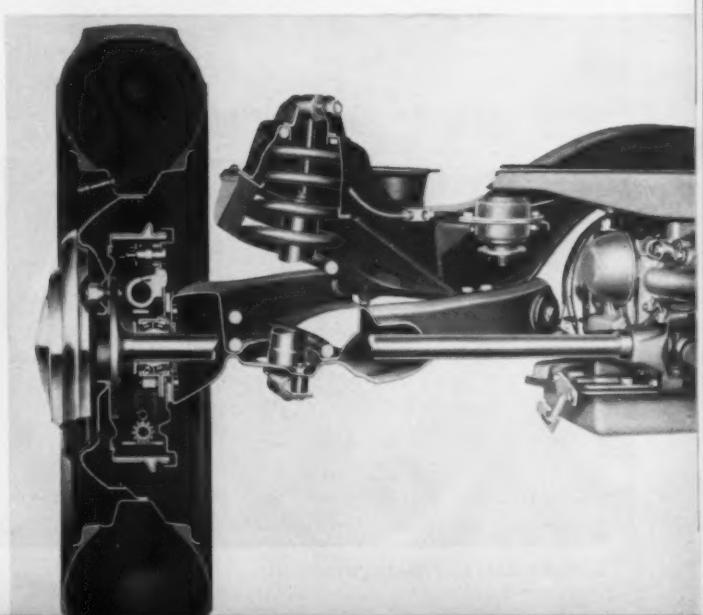
Tempest's body shape looks simple until studied in detail. Contouring along sides is neatly capped by crisply-defined unchromed straight lines.

Bold grille leaves no doubt in viewer's mind that the Tempest is made by Pontiac. Wide-track wheels—for a compact—also follow company ad line.



Test car was fitted with Pirelli tires at one point in fact-finding runs in an attempt to evaluate true worth of Tempest's chassis design.

Negligible transmission tunnel is one good reason for Tempest's trans-axle and "sagging" prop shaft. Good weight distribution is another motive.

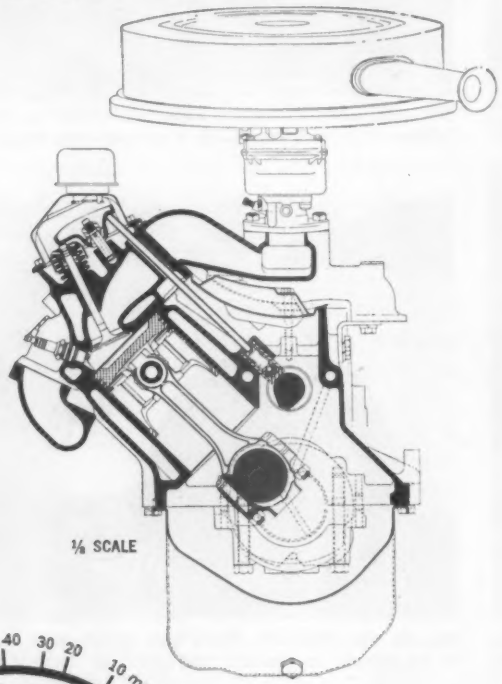


Sectioned swing arm, coil spring and shock absorber show how the Tempest achieves four-wheel independence. Rear suspension is similar to Corvair's.

Road Research Report:

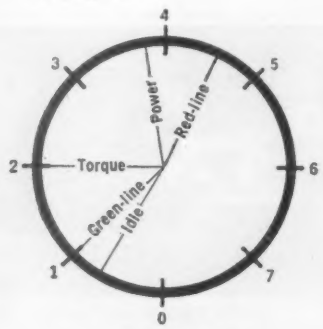
PONTIAC Tempest

Manufacturer: Pontiac Motor Division, General Motors Corp., Pontiac, Michigan
Number of U. S. dealers: 3600
Planned annual production: In excess of 100,000 in 1961 model year
Dollar value of spare parts in U. S.: Not available from manufacturer



⅛ SCALE

Steering Behavior
Wheel position to maintain 400-foot circle at speeds indicated.



Engine Flexibility
RPM in thousands

PRICES:

	manual	(automatic)
Basic Price	$2167 at Pontiac, Mich.	
Options fitted		
Four-barrel kit	——	$26
TempesTorque trans.	——	173
Heater/defroster	$74	74
Pushbutton radio with antenna	62	——
Manual radio with antenna	——	54
Windshield washer	13	13
Outside mirror	——	12
Back-up lights	13	11
Dual horns	4	4
Bumper guards	16	16
Power steering	——	75
Tinted windshield	20	——
Deluxe hubcaps	16	16
Oil filter, HD air cleaner	10	10
White sidewalls	28	28
Interior trim group (includes deluxe steering wheel, upholstery, RH sunshade, cigar lighter)	70	——
Same, w/o deluxe upholstery	——	9
Exterior chrome trim	45	45
Dealer delivery & handling	30	30
Prices as tested (delivered at Pontiac, Mich.)	$2568	$2763
Other options:		
Foam front seat cushion		$ 8
Dashboard padding		16
Tinted windows all around		31
Air conditioner		319
Oversize tires (6.50 x 15)		8
Trophy V8 engine		216
Two-tone paint		12
Special color paint		40

OPERATING SCHEDULE:

Fuel recommended	Regular
Mileage	17-21 mpg
Range on 15½-gallon tank	260-325 miles
Oil recommended	20W or 10W-30
Crankcase capacity	4 quarts to refill (5 with filter change)
Change at intervals of	4000 miles or less
Number of grease fittings	12
Lubrication interval	2000 miles
Most frequent maintenance, rotate tires, check master cylinder	4000 miles

ENGINE: (Inclined Four, "half" of big V8, see text for options)

Displacement	194½ cu in, 3187 cc
Dimensions	Four cyl, 4.06 in bore, 3.75 in stroke
Valve gear	pushrod ohv, 1.5 to one rockers, hydraulic tappets
Compression ratio	8.6 (10.25) to one
Power (SAE)	110 (155) bhp @ 3800 (4800) rpm
Torque	190 (215) lb-ft @ 2000 (2800) rpm
Usable range of engine speeds	1000-4600 (700-4400) rpm
Corrected piston speed	2470 (3120) fpm @ 3800 (4800) rpm

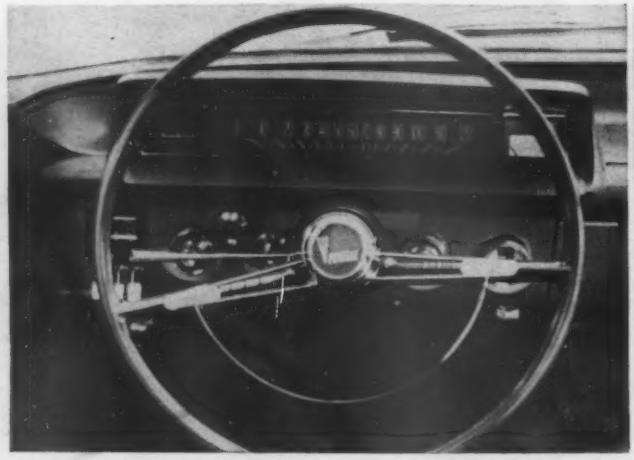
CHASSIS:

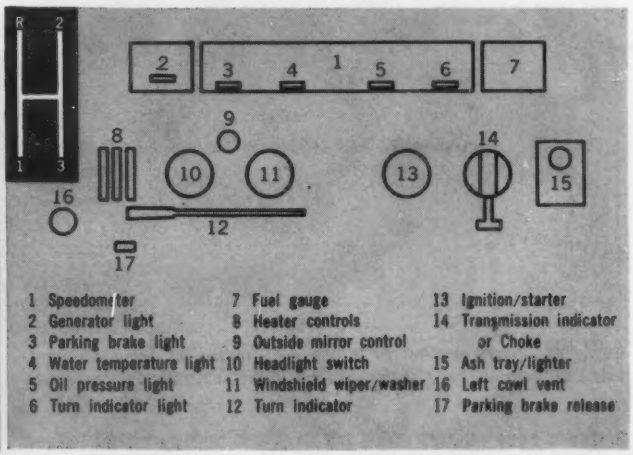
Wheelbase	112.0 in
Tread	56.8 in
Length	189.3 in
Ground Clearance	5.7 (5.4) in
Suspension: F, ind., coil, wishbones, anti-roll bar; R, ind., coil, swept wishbone, swing axle.	
Turns, lock to lock	6.4
Turning diameter between curbs	36 to 40 ft. (see text)
Tire and rim size	6.00 x 15 (see text), 15 x 4½K
Pressures recommended	22 psi
Brakes; type, swept area	9 in drums, 198 sq in
Curb weight (full tank)	3050 (3100) lbs
Percentage on driving wheels	46% (47%)

DRIVE TRAIN:

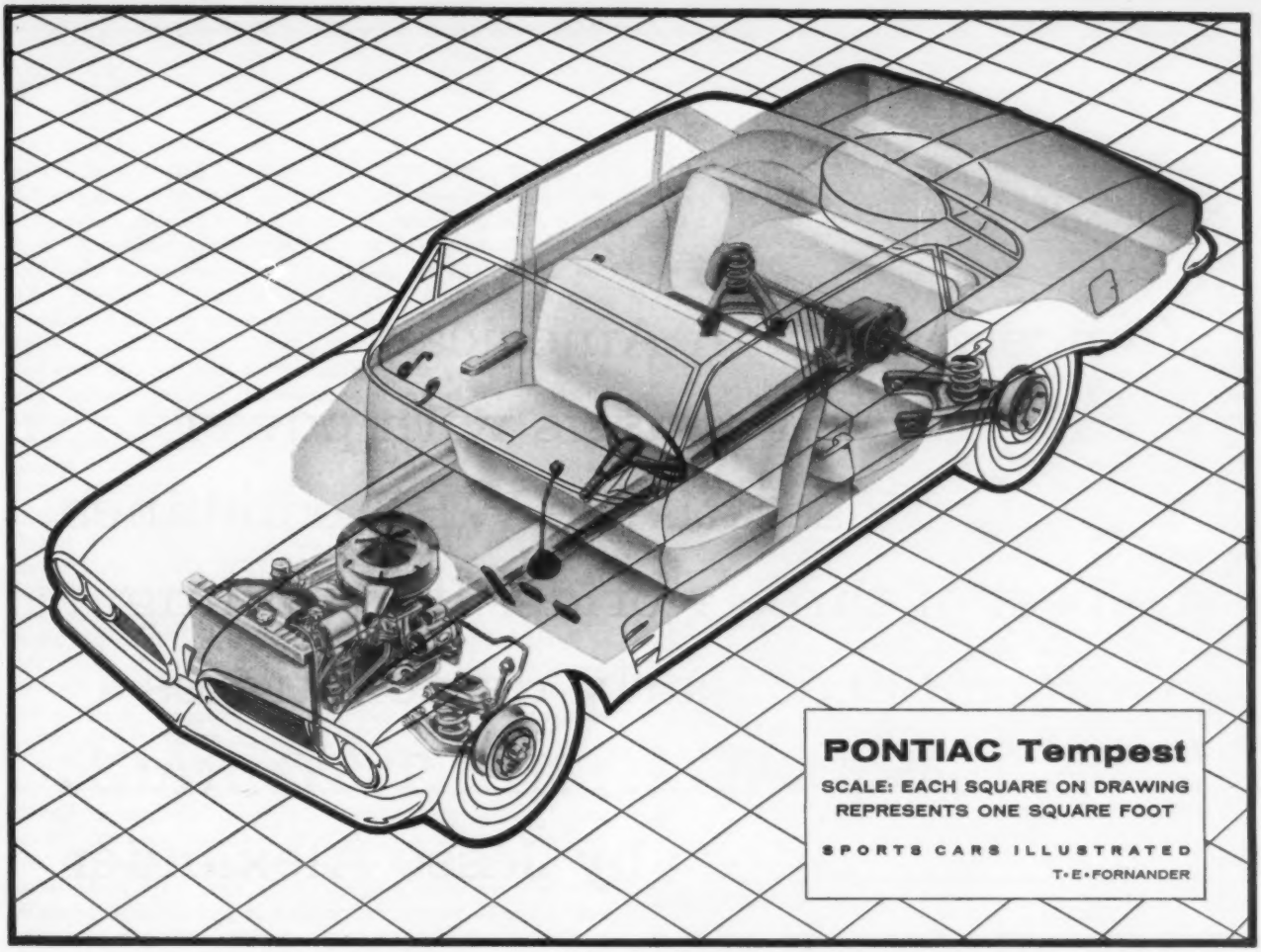
Gear	Synchro?	Ratio	Step	Overall	Mph per 1000 rpm
Rev	No	3.32	——	11.80	—6.4
1st	No	2.94	75%	10.44	7.2
2nd	Yes	1.68	68%	5.97	12.7
3rd	Yes	1.00		3.55	21.2
1st	Auto	1.82	82%	6.46	11.7
2nd	Auto	1.00		3.55	21.2

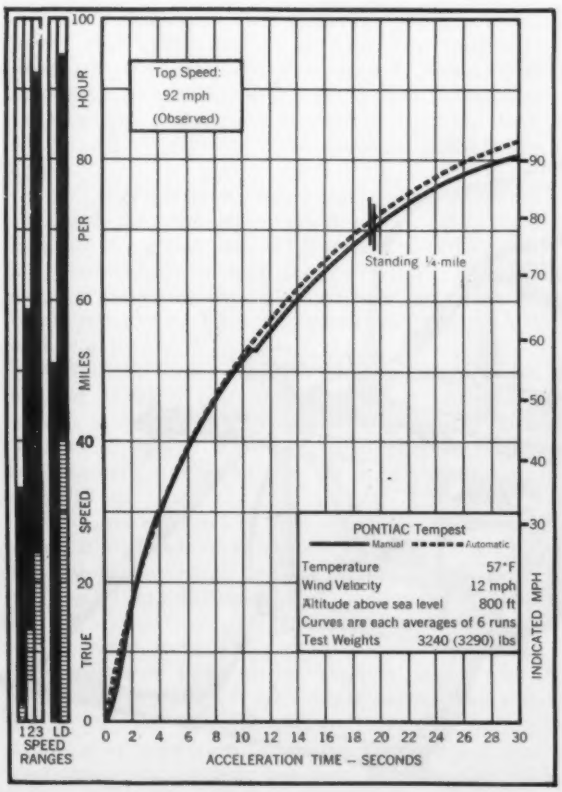
Torque converter ratio: 2.0 at stall
Final Drive Ratios: 3.55 to one standard. 3.08, 3.31 and 3.73 optional.

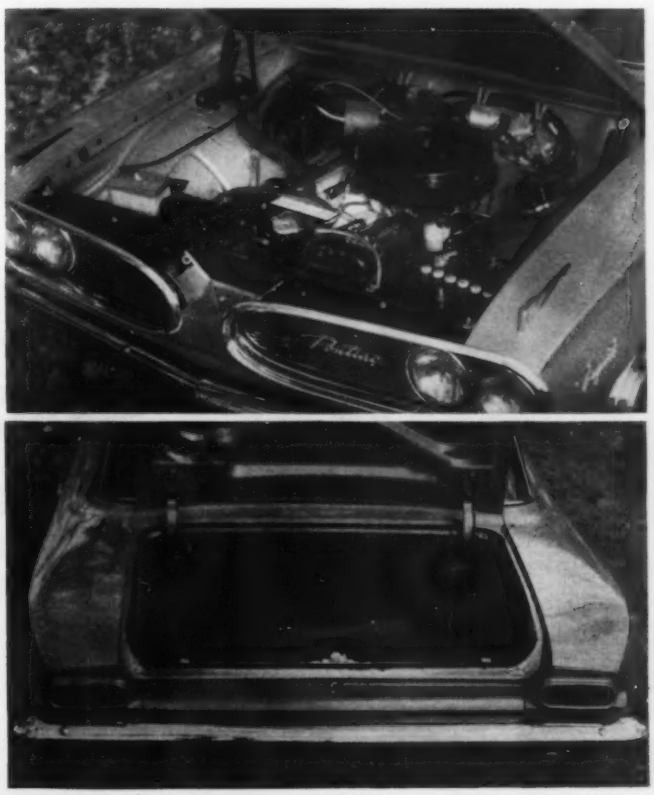




1 Speedometer
2 Generator light
3 Parking brake light
4 Water temperature light
5 Oil pressure light
6 Turn indicator light
7 Fuel gauge
8 Heater controls
9 Outside mirror control
10 Headlight switch
11 Windshield wiper/washer
12 Turn indicator
13 Ignition/starter
14 Transmission indicator or Choke
15 Ash tray/lighter
16 Left cowl vent
17 Parking brake release

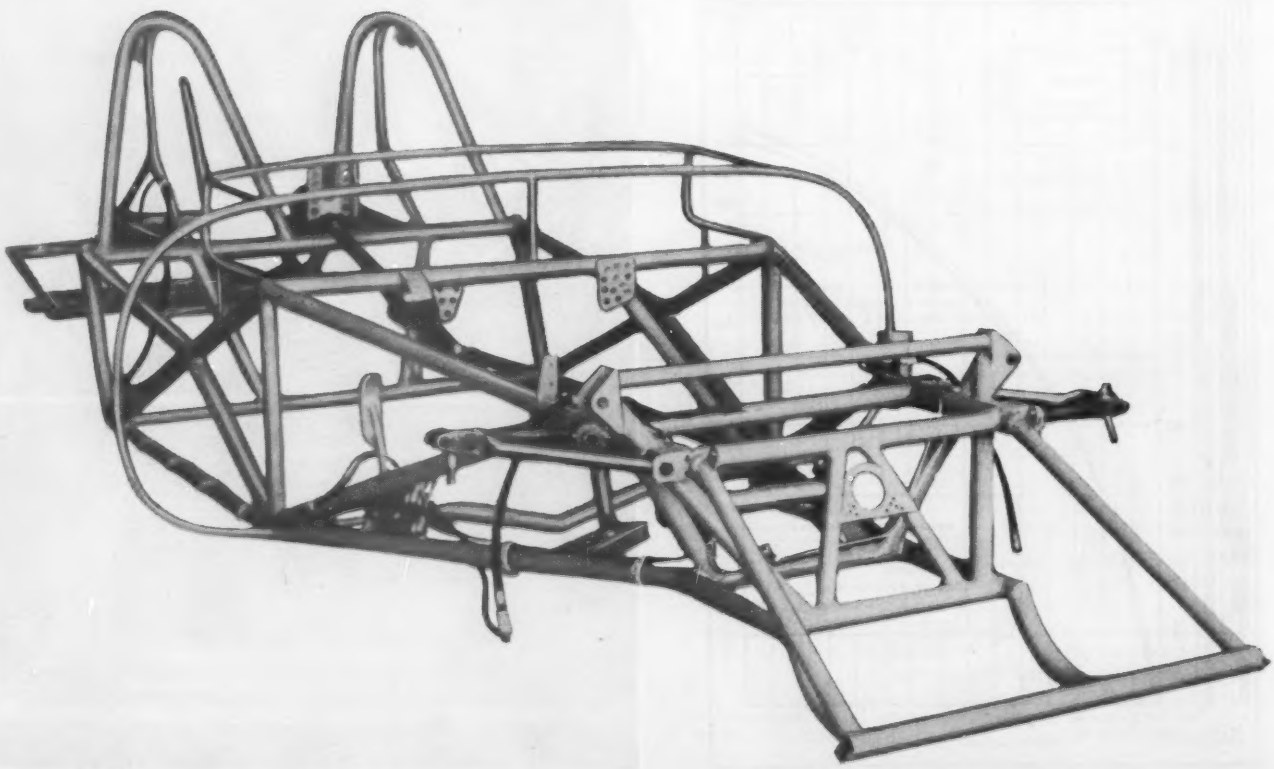

PONTIAC Tempest
SCALE: EACH SQUARE ON DRAWING REPRESENTS ONE SQUARE FOOT
SPORTS CARS ILLUSTRATED
T•E•FORNANDER


Top Speed:
92 mph
(Observed)
Standing ¼-mile
PONTIAC Tempest
Manual
Automatic
Temperature 57°F
Wind Velocity 12 mph
Altitude above sea level 800 ft
Curves are each averages of 6 runs
Test Weights 3240 (3290) lbs
TRUE MILES PER HOUR
INDICATED MPH
SPEED
0 20 40 60 80 100
0 10 30 50 70 90
0 2 4 6 8 10 12 14 16 18 20 22 24 26 28 30
ACCELERATION TIME – SECONDS
1 2 3 LO
SPEED RANGES



Conceived by an American
on a British chassis with power
by Maserati, the WRE combines
the best of three worlds. Its winning
performance clearly demonstrates
that it was... BUILT TO RACE

by Jesse Alexander



► On its very first appearance the WRE 2-liter sports car flabbergasted everybody by easily winning over the best that Italy could offer. This was at Naples, Spring of 1959, when Tony Settember saw off the 200 SI Maseratis of Bellucci and Boffa in the annual race that opens the Italian calendar. The Neapolitans' chagrin was softened slightly when they learned that both Settember and his wife were of Italian ancestry and that the car was powered by a Maserati engine, but elbowing his way to Settember's side was Naple's own Sig. Bellucci – one of the vanquished drivers – who rapidly talked the WRE group into selling him the car. It was later raced in local sprint events and hill climbs with equal success.

Mr. Bellucci has had two more of the sports-racing cars built and has been running them in an all-Italian scuderia during 1960. Settember is no longer actively associated in construction of the WRE, his place having been taken by John Wadsworth, a young Englishman who, with his family, has already spent over a year in Modena where the WRE is built. "It's not only cheaper but very often much easier to get things done here in Modena," says Wadsworth, an ex-RAF pilot and former collaborator of John Willment, for whom he designed and built two complete sports cars including their five-speed transmissions.

When I visited Wadsworth in Modena WRE number two was waiting for its new gearbox while the chassis of number three had just been completed. Inspecting this frame I commented on its robustness. Wadsworth remarked, "By English standards it's undoubtedly too heavy but by Italian standards it's just right. Don't forget that it was originally designed with the use of a Chevrolet engine in mind. We hope one day to be able to build these in the States and ship the components over from Italy. She'll take a Halibrand rear end too."

With a Chevrolet fuel injection engine installed, the power unit would have to go back three inches from the present Maserati four-cylinder position. More interesting is the projected placing of the Chevrolet transmission. Since the large bell housing would interfere with the driver's feet, Wadsworth has planned a rear-mounted gearbox and differential.

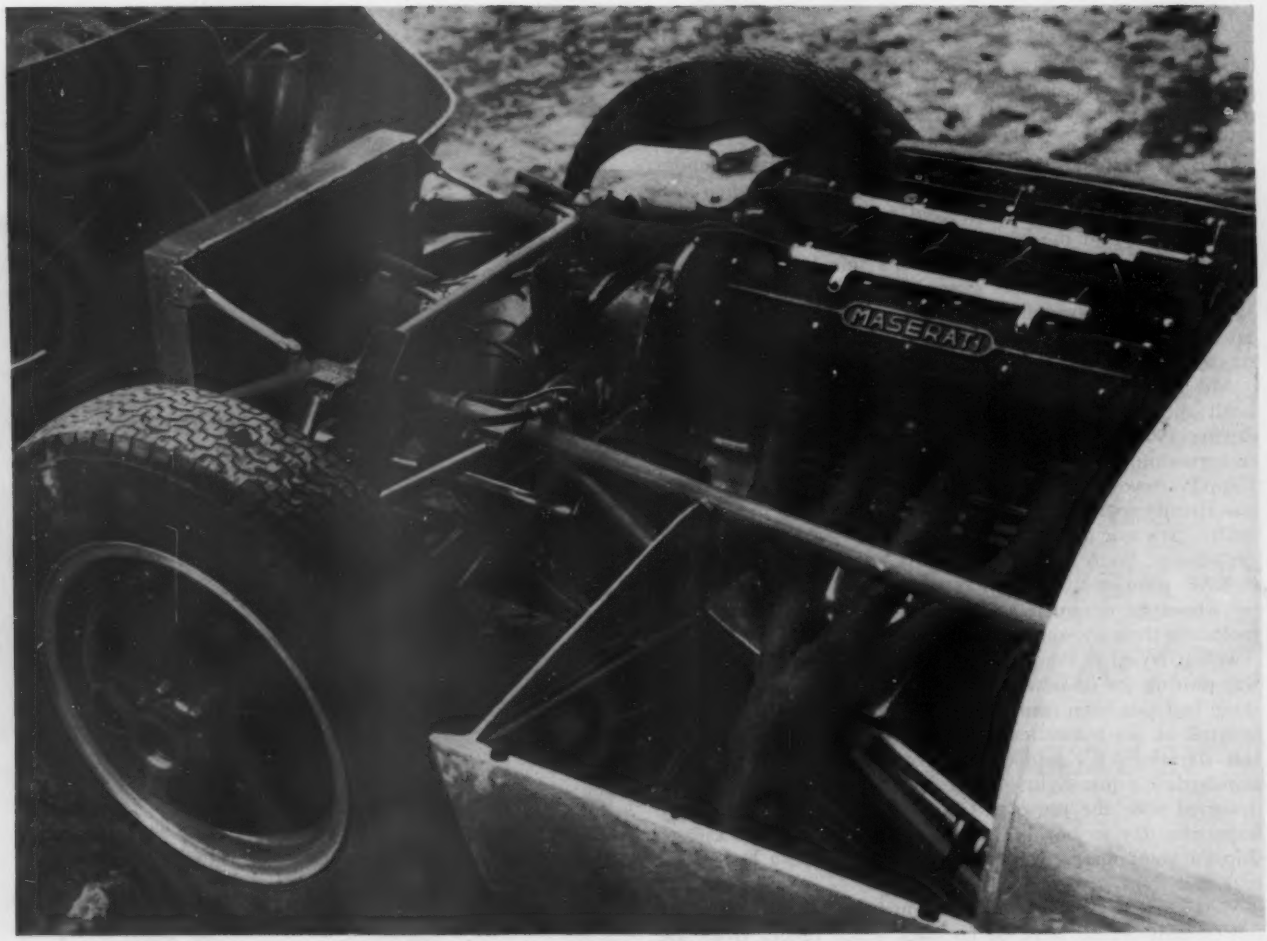
The 2-liter Maserati engine isn't cheap. A Modena price of $5600 plus the transmission makes each WRE worth close to ten grand, but Wadsworth pointed out that with a Chevrolet power unit the car would be considerably cheaper, reckoning on a Modena price for chassis and body of around $5000. Fiberglass could easily be used for front and rear panels.

Wadsworth wasn't satisfied with the performance of the original Maserati gearbox and therefore commissioned Colotti to design a light four-speed constant-mesh transmission. The Maser engine is offset four degrees from the vertical, the weight balancing that of the driver, and allowing more pedal room.

Unsprung weight has been chopped to a minimum; the rear Girling single-spot discs are mounted inboard. But perhaps more interesting is the all-independent wishbone suspension. Two roll bars, part of the frame, carry the top ends of the springs and Armstrong telescopic shock absorbers are actuated by the upper wishbones. The brake system incorporates a twin master cylinder setup with balance pipe. The rear calipers are slightly smaller than those at the front. A Fiat "Topolino" handbrake has been fitted to satisfy that requirement, and the ubiquitous Morris Minor rack-and-pinion steering has been fitted to the WRE.

Normal weight distribution of 44-56 is considerably altered as happy constructors perch on the rear deck of newly-finished WRE number two.

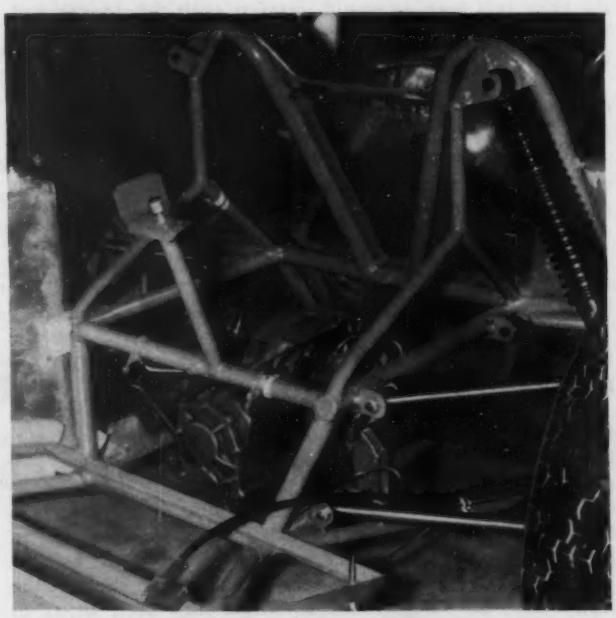
Colotti-designed gearbox has to be husky enough to take 133.7 lb-ft of torque and 190 bhp delivered by the 121.5-cubic-inch Maserati engine.



Slender chassis and suspension members make car's weight of 1350 pounds understandable. WRE's 89-inch-wheelbase chassis fits Maserati four or Corvette. When or if bigger engine and Corvette transmission are used they will have to be moved back about three inches in the WRE's 49¼-inch-wide tube frame.

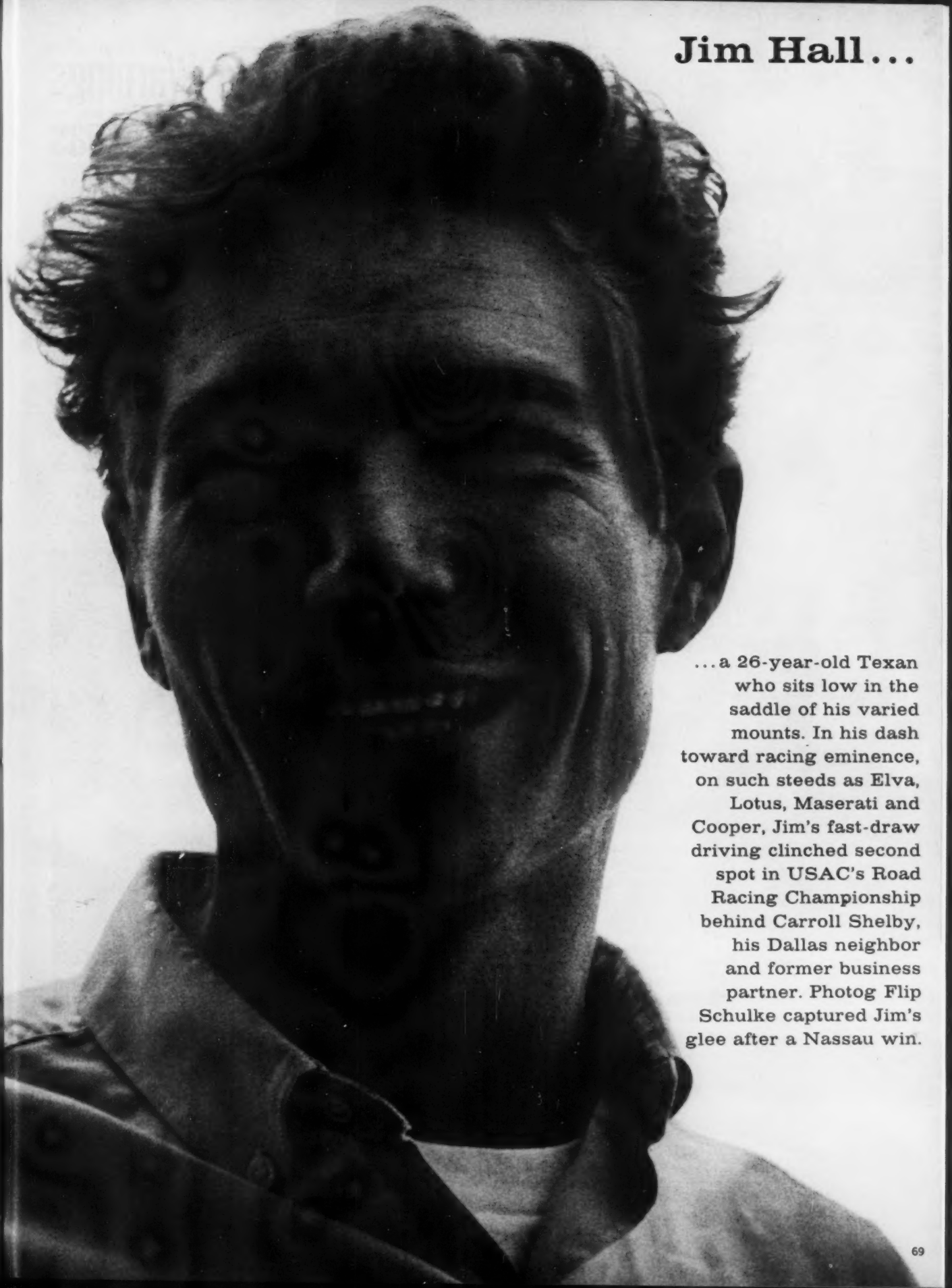
The latest two frames have undergone slight alterations to accommodate the raised spare wheel and required luggage space decreed by the F.I.A. Thirty-five gallons of fuel are carried in saddle tanks amidships, while a 6½-gallon oil tank is located at the rear. Griping about the high windshield that is now necessary, Wadsworth took me to the rear of his small shop and pulled out a drawing of an exotic full-race coupe on the present WRE chassis. Whether or not this solution to the problem will ever actually be executed is difficult to say. However, as Wadsworth reminded me, "Anything is possible in Modena." WRE, by the way, used to stand for "World Racing Enterprise" when Settember set it up, but Wadsworth is considering changing the meaning. He's grateful that his own name begins with "W"!

There's a storybook ending to this installment in the tale of the WRE. When the two latest cars appeared in the 1960 Naples Grand Prix, they were driven by Boffa and Bellucci against strong opposition from the likes of factory-prepared Type 60 Maseratis (the two-liter "Birdcages"). Whether or not WRE has a hex of some kind on the twisty Posillipo circuit we'll never know, but in spite of a crash on the second lap Boffa put in a heroic drive to beat the Masers for the second year running. Pretty fine for a British-designed sports car originally built in Italy by an American! —*JLA*



Twin roll bars and high-mounted combined coil spring and shock absorbers are interesting WRE features. Rear end is a Halibrand quick-change unit.

Jim Hall...

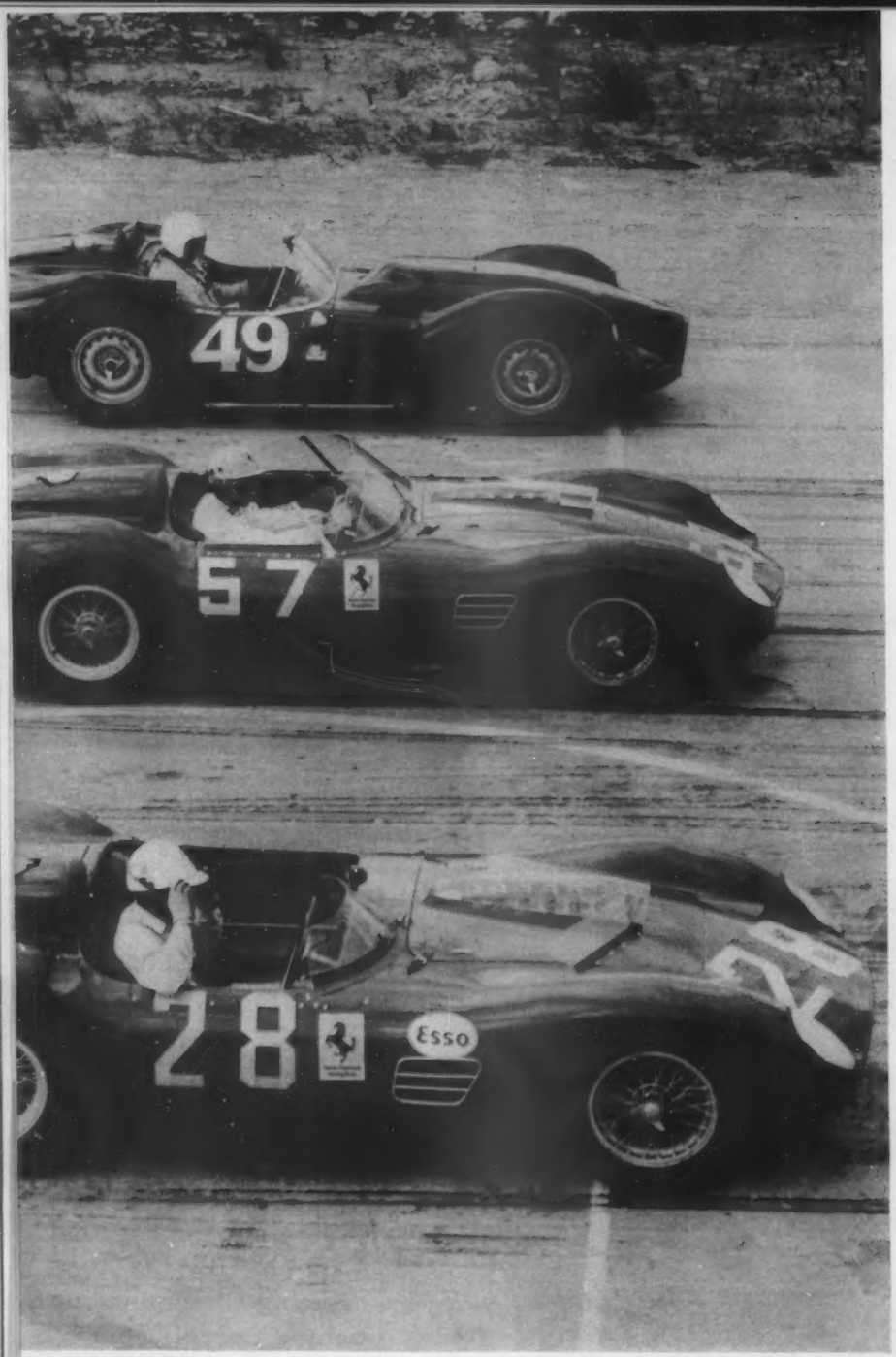


...a 26-year-old Texan who sits low in the saddle of his varied mounts. In his dash toward racing eminence, on such steeds as Elva, Lotus, Maserati and Cooper, Jim's fast-draw driving clinched second spot in USAC's Road Racing Championship behind Carroll Shelby, his Dallas neighbor and former business partner. Photog Flip Schulke captured Jim's glee after a Nassau win.

Storm Warnings In The Bahamas

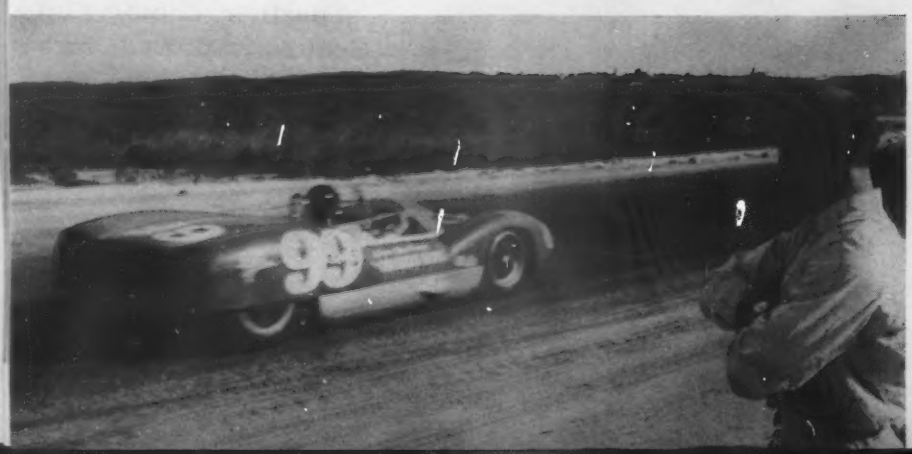
by Herb Williamson

Waves of sports cars and Formula Juniors inundated Nassau for the annual Speed Weeks. The lull before the storm, occupied mainly with preliminary events and socializing, was broken with fury when Dan Gurney unleashed his Lotus, leaving the opposition foundering as he set a new record for the featured Trophy Race.



PHOTOGRAPHY: SCHULKE

Ricardo Rodriguez won the Governor's Trophy with his 3-liter Ferrari. Brother Pedro, No. 28, and Constantine's Kelischev did not finish.



A disconsolate Moss joined spectators at the Esses watching Gurney ride winning Lotus to top honors after his similar car died on lap 1.

► Big, blond Dan Gurney earned his first major solo win in six years of racing as he blistered across the finish line of the annual Nassau Trophy Race at an average of 89.54 miles per hour – a new record for the event which traditionally marks the close of Speed Weeks in the Bahamas. The 29-year-old Californian, whose driving appeared as casual as his deportment, earned the victory despite the evaporation of major competition earlier in the race.

From the Le Mans start, Gurney kept his 2½-liter rear-engined Lotus within striking distance of a hot-footing Ricardo Rodriguez who treated the 247.5-mile grind as a club sprint race, grabbing the lead on the first lap and trying desperately to increase his advantage with each tour.

The youthful Ricardo handled his fiery red 3-liter Ferrari with all the agility of a seasoned commuter dashing for the 8:05. He pressed relentlessly, passing and lapping slower cars in the 56-car field. There was a reason behind the apparent folly of pressing his car almost to the limit right from the start. It was, simply, the amount of fuel his Ferrari carried and consumed. It was his thought to grab an early, secure lead to enable him to pull into the pits somewhere around the 35th lap for refueling. However, when he did make the stop, at the 40th lap, Gurney had already begun his drive for first spot. He was cutting into Rodriguez's advantage and the gap between them was a scant seven seconds with 15 laps left to drive.

Some pitside observers felt Rodriguez had lost the race in the pits. His stop was timed variously at 47, 50 and 52 seconds; at any rate it was long – long enough for Gurney

Jim Hall, of Dallas, received congratulation from Capt. Sherman "Red" Crise, the Barnum of Speed Weeks, after winning Pan American Junior go.

to grab first and build up a lead of almost a minute and a half by the time Pedro Rodriguez, who had taken over the Ferrari helm for his brother, began to find the groove. As the race neared its end, the orange-red Gurney Lotus gained speed, its fuel load lessening. The gap between him and Pedro narrowed, but he was never seriously threatened.

Gurney was jubilant as he took the checker and with it some $10,000 in prize money. He had gambled and won. His car was of dubious reliability. He had driven the Arciero-owned Lotus twice before in competition. At Riverside and again at Laguna Seca, it had broken down; once with a blown head gasket and the other time with a sheared flywheel. Rain had marred practice, so he was unable to get accurate gas mileage checks at racing speeds. He risked running out of gas by not making a pit stop, and came in on the money. His position prior to the race was dubious; at best he was considered a dark horse – one to watch but not to bet on too heavily. His only other previous international win had been earlier this year in the 1000 Kilometers at the Nürburgring co-driving with Moss (SCI, September, 1960) – he had yet to claim a major solo triumph.

At the finish, Dan expressed some surprise at winning (although it was probably ill-concealed exultation). He did say, however, he thought he could have caught Rodriguez if the latter hadn't had to make that all-important pit stop. His car was getting faster and he appeared fit for another 250 miles of racing. Because of darkness closing in, the race had been shortened by one lap, but there was little doubt that if it had gone the full distance, another 4.5 miles, the victor would have been Gurney.

But Gurney's win isn't the whole Nassau story. Technically the annual action is called Speed Weeks, an accurate description in view of the variegated kart, sports car and F. Jr. tangles offered. But an equally apt title might be International Sports Car, Cocktail Party, Get Thrown in the Pool, Lie on the Beach, Get Taken as a Tourist Weeks. It's a unique event and one doubts the constitution could stand such a spree more than once a year. It begins quietly as your jet swooshes in for a landing on New Providence Island – a There'll Always Be An England state of mind almost completely surrounded by tourists. The brass band is there to meet you, looking veddy colonial. Even before you go through customs a cooling glass (rum, naturally with gin optional) is waiting. Elizabeth II beams benignly from a picture though the sight of palms and semi-tropical foliage leads you to expect hearing God Save The Queen with a Calypso beat.

Gurney's well-paced drive earned him more than $1.00 per second and the Nassau Trophy he holds.

After checking in at your hotel ("every room air conditioned, with a view of the sea or the pool"), checking in at Blackbeard's, Dirty Dick's, the Junkanoo, the Pilot House, the Emerald Beach and other island watering spots offers an opportunity to meet the drivers and those running the show. At least one person got tossed in the pool, so on that score as well as the sociability and driving counts, the Weeks may be termed a success. As the Weeks progress, normally blue-tinged northerners begin sporting freckles, suntans and sunburned noses. The memory of Thanksgiving turkey is quickly supplanted by Bahamian savories. Everybody wears a straw hat and begins feeling very insular. Driving on the left becomes second nature though passing with left-hand-drive cars continues to be invigorating.

The racing action began November 23 with kart practice. It was followed the next day with initial heats in the classes and on Friday the 25th with the World's Championship events won by 16-year-old *(Continued on page 82)*

LAND ROVER Station Wagon

► "Don't worry, we'll make it!" shouted the driver each time I clawed wildly to brace for the rollover that seemed imminent. We were heading up a precipitous trail, crawling slowly up the crest of a razorback peak with just enough firm ground underneath to support the four wheels.

At last we reached the top and a miniature plateau. I forgot for a moment what lay behind and took in the views to the left, a range of higher mountains, while far to the right the Pacific shone dully through a shroud of haze. It seemed incredible that minutes before I had been sitting comfortably in the Pasadena showroom of Peter Satori, Inc., listening to an explanation of the Land Rover station wagon. Then when Rover Division manager Joe Krumbolz volunteered a brief demonstration ride, I accepted. And here we were.

Nothing for that now. "How do we get out of here?" I asked Joe, now obviously in his element. His reply was to

How's this for a functional cockpit layout? Lockable storage cabinets are under each chair-height seat. There are three central shift levers!

engage first gear-low range and aim carefully for the apparent edge of a sheer cliff.

Down we plunged, making haste slowly. Without any official measurement, just say the grade was steep; it appeared to be a wild 45 degrees. Yet with the low range first gear's 40-to-one overall ratio yielding a mere 2.2 mph per 1000 rpm, it was unnecessary to touch the brakes. Only when we nosed over into a still steeper downturn was Joe forced to stab quickly at the brake pedal to slow us.

Very quickly we arrived at the bottom in safety with a sigh of relief. Thus ended my first ride in a Land Rover. After reflection, I realized that this was no gimmick thrill machine; it was and is a muscular vehicle that will take just about anything man can deliver. And after a few hours behind the wheel, I became convinced that the only limit to the vehicle is the bravery (or foolhardiness) of the driver. Better yet, it's a tremendous kick to drive.

What makes it so? As in most truly efficient vehicles, it is a combination of many things. The Rover Company started from scratch (there is no relationship to their passenger models) to design and build what they call "the world's most versatile vehicle." Versatile in this context means a machine that is suited for normal highway use, but finds its true *métier* plowing across desert sand or streaming jungle, poking into normally inaccessible spots anywhere on the globe.

Versatile also means an amazing choice of vehicles from two wheelbases (88 and 109 inches), and either a 51-bhp, 123-cubic-inch Diesel or a 77-horse, 139.5-inch gasoline engine. We tested the most elaborate civilian model they make, the long-wheelbase station wagon, which is available only with the gasoline engine. The list of optional body configurations includes a basic pickup with a canvas top, the same with a hard-top cab, plus a full length hardtop with or without side windows, and two each station wagons and fire engines.

It's trite to say that the Land Rover is rugged. What else could it be for its purpose? The chassis frame and crossmembers are built up from flat plates into very deep box sections. With a 9¾-inch ground clearance it is nearly impossible to hang the Rover in a rut. Though that much open space below coupled with an 81-inch overall height indicates a top-heavy machine, it's not so. The body panels are constructed of light alloy so that weight above the frame is held to a minimum. Steep side hills are thereby safe to traverse.

The alloy body is one of the machine's fascinations. Straightforward in the extreme, it is a mass of exposed rivets and hinges, galvanized steel reinforcing plates, handles, knobs and sliding windows. The little functional touches tell of the thought that entered its design. For example, tiny bits of plastic tubing inserted in the body just below the six sliding side windows carry rain water from the window channels to the outside; all the door handles are recessed into the body so that one may travel through thick underbrush without getting entangled. In fact, there are no projections on, under or above the body. Grille and headlights are deeply set back from the fenders for pushing through brush country and the front bumper is a ⅛-inch-thick galvanized steel box section that appears capable of bowling over small trees. Exposed members underneath are also extra-heavy-duty.

Short of air conditioning, the best substitute is the unusual tropical top. It is an additional alloy panel mounted with about an inch of air space between it and main roof. This reflects much of the sun's radiant heat and allows the four vents in the roof itself to be opened for fresh air without allowing rain inside the vehicle.

Everything is related to its function. There was no waste motion in an attempt to design an elaborate interior. For example, a pair of windshield wiper motors stare right back at one from the bottom center of each half of the split glass. Need a little more fresh air than is provided by the sliding windows and the roof vents? Just turn the two large black knobs above the dash. Each controls a rectangular trap door that opens out just below the windshield. Screens are optional to keep out the tsetse flies. At the base of the dash is a convenient hand throttle on a notched quadrant. Conceivably, the going could get so rough that one couldn't hold the right foot steady enough.

Upholstery is a serviceable gray plastic on the bench seats. The headliner, in startling white plastic, contrasts sharply. A twin dome-light system reflects off it, lighting the interior most satisfactorily. At night you can read a map, comfortably, in any seat in the wagon. Under the front seats are two covered lockers that can be secured with padlocks; under the back seats there is substantial storage for tools and incidentals.

Three-abreast front seating is possible but the center man must look sharp to avoid the trio of gear control levers. Their scheme is so: the big lever on the center of the tunnel engages a conventional four-speed box; to its right is a stubby lever with a bright yellow knob; a few inches more right is another short lever, this one topped in red. Push down on the yellow and one has engaged four-wheel drive —

this may be done while moving. Pull back on red and low range takes over, four-wheel drive automatically engaging. The vehicle must be stopped to select low range. From our gear ratio chart the variety is evident. Part of the fun of driving is charging up impossible slopes and then experimenting to find the best of the twelve forward combinations for the job.

Many American owners who do significant mileage on highways in rear wheel drive find it worthwhile to install Warn hubs at the front to improve the free-wheeling. (Warn Mfg. Co., Riverton Box 6064, Seattle 88, Wash.)

Only 77 bhp for 3740 pounds means that acceleration isn't going to be much – and it isn't. It really isn't too important that the Rover only hits 49 mph in the standing quarter-mile unless you're trying to out-race charging elephants. A comfortable highway tempo is 65 mph; it can be maintained for hours without strain. Fuel economy is not sensational; we realized a range of 11-14 mpg on Mobilgas regular during our rugged test.

Vitals under the hood are easy to reach. The four-cylinder o.h.v. engine is fractionally oversquare, developing its 124 lb-ft of torque at only 2500 rpm. Horsepower peaks at a mild 4250 revs and from the sturdy way in which the engine is laid out it should prove trouble-free for a long period with only nominal care.

Steering is worm and nut with recirculating ball. It is easy to manipulate while moving, but it's a man-sized job to parallel-park the Land Rover. We understand the necessity for four turns of the wheel from lock to lock.

After a look at the four beefy semi-elliptic springs that are the heart of the non-independent suspension, it is safe to assume that the resultant ride is firm. It is comfortable along the highway but be assured that there is no wallowing through dips.

This is the only station wagon that we have ever seen that will really carry 10 adults. Front and center seats carry the usual three each The rear seats – enter through the back door, please – fold down from each side and allow four people to face each other, working out among themselves where all the knees go. Fold the center seat forward, lash the rear seats in their raised position and presto: a long cargo area just like American wagons.

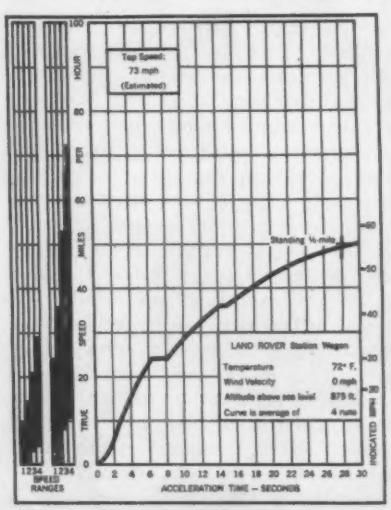
Three persons can pack in on a long safari with a ton of supplies in this model. If it's a luxury safari they might consider utilizing the three power-takeoff points available. A winch may be fitted at the front (a must for swamp country) while inside, the center takeoff will drive generators for lighting, radios, air conditioning or whatever is desired. The rear power point can be fitted with pulley drive for saws, mowers, threshers, etc.

It's not a cheap plaything, the Land Rover wagon. From a West Coast base price of $3880, the added cost of heater, water and oil gauge, hand throttle and second windshield wiper brings it to $4095 plus tax and license. In relation to what's comparable, this is costly. The Japanese Toyota Land Cruiser, 135 bhp, lists for $3365 but it has no transmission low range; DKW makes a much smaller Jeep-type four-wheel-drive machine for $2995; the Willys Jeep, refined through many years, is based at about $2500 for a 101-inch-wheelbase model but it won't carry as much or as many as the Land Rover. The Rover boys build a lot of quality into their package. You won't see many on Park Avenue or Wilshire Boulevard, but in pith helmet or parka country a Land Rover is the height of fashion. *—Wayne Thoms*

LAND ROVER Station Wagon

Price as tested: $4095 (West Coast)

Importer: Rover Motor Co. of North America Ltd.
36-12 37th Street
Long Island City 1, N. Y.



ENGINE:

Displacement	139.5 cu in, 2286 cc
Dimensions	Four cyl, 3.56 in bore, 3.50 in stroke
Valve gear	Pushrod overhead valves, roller tappets
Compression ratio	7.0 to one
Power	77 bhp @ 4250 rpm
Torque	124 lb-ft @ 2500 rpm
Usable range of engine speeds	650-4500 rpm
Corrected piston speed @ 4250 rpm	2500 fpm
Fuel recommended	Regular
Mileage	11-14 mpg
Range on 19 gallon tank	210-270 miles

CHASSIS:

Wheelbase	109.0 in
Tread	51.5 in
Length	175.0 in
Ground clearance	9.8 in
Suspension: F & R, rigid axles, longitudinal semi-elliptic underslung leaf springs.	
Turns, lock to lock	4.0
Turning circle diameter between curbs	45 ft
Tire and rim size	7.50 x 16, 16 x 6
Pressures recommended: 22 psi normal, 22/36 psi heavily loaded	
Brakes; type, swept area	11 in drums, 311 sq in
Curb weight (full tank)	3400 lbs
Percentage on driving wheels	100%
Test weight	3740 lbs

DRIVE TRAIN: (Includes two-speed transfer box)

Gear	Synchro?	Ratio High-Low	Step	Overall High-Low	Mph per 1000 rpm
Rev	No	2.92-7.35		13.75-34.59	6.4-2.5
1st	No	3.44-8.66	47%	16.17-40.69	5.4-2.2
2nd	No	2.34-5.90	48%	11.03-27.74	8.0-3.2
3rd	Yes	1.58-3.98	37%	7.44-18.71	11.8-4.7
4th	Yes	1.15-2.89		5.40-13.58	16.1-6.4

Final drive ratio: 4.70 to one, front and rear.

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GRAND PRIZE AT RIVERSIDE

Continued from page 30

to catch only one race of the Formula for which it was intended. In June of 1960 Cooper finished a brand-new G.P. chassis to the 1959 design for Lovely, who had it in July. To power it Pete already had a type 625LM Ferrari engine out of Johnny von Neumann's 1957 2½-liter Testa Rossa. This four-cylinder 94 x 90 mm powerplant is identical to the ones in the 1956 Le Mans team cars, and is actually an expansion of the two-liter Testa Rossa of that time. Fitted with 45 mm Webers, as in Pete's car, and running on gas, it should deliver 225 bhp at 7000 rpm. This was enough to propel the beautifully-finished car at a 2:03.4 clip in practice.

One short of the slowest car, at 2:05.4, was the classic machine of the 2½-liter Formula, a 250F Maserati. Owned by Joe Lubin and driven fast and well by Bob Drake, this is one of the "Piccolo" 1958 Masers, probably the second such car built (serial no. 2533). It's just as it was raced in those days except for the front brakes, which are Girling discs like those on the Birdcage — entirely suitable because the Birdcage front suspension is a direct steal from the "Piccolo" G.P. car!

On the day before the Grand Prize a persistent wind made practicing and spectating difficult, not to mention competing in the Formula Junior race that got away at noon. This was mostly between Bill Krause in a Lotus and Walt Hansgen in the magnificent new Cooper Junior, which looks just like the 1960 G.P. Cooper and in fact uses many parts from the bigger car. Parenthetically, this may well be the first Junior to break the $6000 barrier. Walt won by 12 seconds over Bill, turning a 2:15.2 lap in the process. Pomona-winner Ken Miles could do no better than fifth in the Ford-powered Dolphin.

Sunday brought fine race weather without Saturday's siroccos, and at noon it brought a "Compact Sedan Car Race" that was even more of a farce than last year's Ulmann-promoted event at Sebring. It calls for no comment, except that Walt Hansgen's fastest race lap in the factory 3.8 Jaguar was 2:25.0; D-Types don't go much faster than 2:15 at Riverside. Between this event and the two o'clock start of the G.P., first Zora Arkus-Duntov and then Stirling Moss toured the track in Chevy's CERV-1 *monoposto* tire-testing machine. The car had been out on the Coast for tests about a week before the race and the organizers had persuaded Chevy (who was not without misgivings on this point) to leave it there for this display. No hot laps were turned.

It's obvious that Riverside is a far better track for G.P. racing than Sebring, but this never showed so clearly as at the start. On the wide concrete in Florida the cars were spread out and much of the spectacle was dissipated, but here they snarled and bellowed off the line and into the first left bend with all the drama inherent in this most exciting moment. Tragic, though, was the stalling of the Coopers of Gendebien and Phil Hill. Both were pushed off well behind the field.

Moss's intention was to hold back just off the pace until the last quarter of the race, to try to beat his non-finishing record at Riverside, but he was handed the lead on lap 5 when leader Jack Brabham was startled by an explosion in the engine room that "almost blew me out of the car." He stopped at the pits then, went out again, then came back in on lap 9 to remedy matters. A vent on one of the fuel tanks had come adrift, allowing gas to slop over into the belly pan from the full tanks. Vapor from this fuel went off with a "whoomp" whenever the exhaust pipe belched a healthy backfire. When Jack rejoined the race he was 19th, behind Bob Drake and Ian Burgess, who had spun his Cooper-Maser in Turn 6 on the second lap and pushed it to get it going again.

In many other ways the first ten laps were frantic. Dan Gurney was second behind Brabham as the first lap began but lost this spot to Moss when his shift linkage acted up, giving him first instead of third on a downshift. The same thing happened again on lap eight, letting Bonnier past, but Dan had overhauled Joe again by lap 12. To add to Dan's troubles the exhaust manifold had broken loose on the second lap, making the B.R.M. "sound like a Model T."

Just behind the four leaders the whole Lotus team came past on the third lap in numerical order: Ireland, Surtees and Clark. Jim Clark had let Surtees by, being content to follow for the time being, but as they came out of the esses and into Turn 6 Surtees spun and Clark unavoidably clouted him. Both limped back to the pits, first Clark and then Surtees, causing mass confusion in the Chapman domain. Surtees's car was badly bent around the front suspension while Clark's only had a rent in its fiberglass nose section, so the nose was taken off the first car to make a good one out of the second. Almost good, that is, for Clark's water pump apparently was damaged in the accident and called for regular pit stops through the rest of the race.

Mass default by the Lotus team suddenly thrust Tony Brooks up into sixth place and then into fifth when Brabham fell back, giving him an excellent position while the race was still young. But on lap seven he overdid it on left-hand Turn 7, and killed the engine as he spun. Tony denied he was going too fast, feeling that oil leakage or some other mechanical problem had caused the spin, but an examination after the race showed an absolutely perfect Cooper-Climax. Ken Gregory was considerably piqued at this and, perhaps rightly, felt Tony could have made more of an effort to get the car going again.

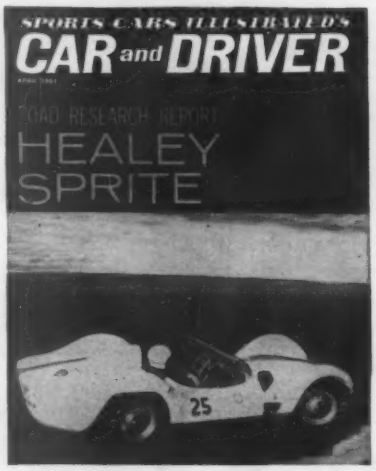
Other early-lap pit stops were made by Henry Taylor, whose Yeoman Credit Cooper first showed the overheating problems that later affected Gendebien as well, and by Trintignant, whose Cooper-Maser developed a fuel leak. After tooling along in 17th place for a while, well behind Daigh in the Scarab, Ron Flockhart retired his Cooper on lap 11 with brake complaints.

All these troubles only left the track clear for the leaders, who were moving along at about a 1:58 (99.8 mph) clip with Moss six seconds ahead of Gurney. A second behind Dan, Bonnier was followed seven seconds later by Ireland, who had 29 seconds on McLaren. Except for the exhaust pipe problem Gurney was riding comfortably, well placed for the long 75-lap haul. But during lap 18 Dan felt a shower over his shoulders and drove straight into his pit. Water was geysering out from a hole in the cylinder head that couldn't be plugged. The B.R.M. cylinder head is a very complex casting, as SCI readers saw last month, and they'd had some trouble getting core sand out of the cavities just above the combustion chambers. To do it, two holes were drilled above each cylinder, the sand blown out, and the holes plugged again with small screws very carefully sealed in place. This was the first time one of those plugs had ever worked its way out. Graham Hill's engine, the oldest of the three, was the only one without these plugs. Graham had to give up a promising fifth place after 35 laps with a gearbox locked in two gears at the same time.

Hill's defection let smooth-running Jim Hall up into fifth place and Phil Hill, who'd been trying hard from the start, into sixth. This order — Moss, Bonnier, Ireland, McLaren, Hall, Hill — remained unchanged from lap 36 through lap 59, when Bonnier's B.R.M. acted as badly as it had been sounding and fell back, letting Ireland into second on lap 60 and McLaren into third during a pit stop a lap later.

Just as quickly as Moss had been lapping cars, Jack Brabham had been picking up places — though remaining over a lap behind the leading Lotus. Jack passed Drake on lap 12, Lovely on lap 19, Daigh on lap 20 (the two blue and white cars were quite close), Trips on lap 22, Salvadori on lap 35, Phil Hill on lap 58, Hall on lap 67 and the sick Bonnier on lap 68, ultimately placing fourth. In the process he set several fastest laps, finally leaving the figure at 1:56.3. At the finish, Moss had lapped everybody except Ireland and McLaren, in second and third places. Poor Jim Hall was just barely lapped a second time on the final tour, when he had a drive line failure.

WANTED!



By all automobile enthusiasts — the first issue of Car and Driver. Ask for Car and Driver at your news-stand on March 2nd.

Luckily he could coast around to get seventh place, just ahead of Roy Salvadori.

Brian Naylor was making his J.B.W. perform as well as it ever has against a full G.P. field, holding tenth place on laps 19 and 20 ahead of the quickest of the Centro Sud Coopers with identical power — von Trips's car. On lap 20, though, he had to retire with a broken upper left wishbone ball joint for which no replacement could be found. Burgess kept struggling along at the back of the field until he finally retired his oil-streaked Cooper-Maser with gearbox maladies, shortly before lap 30.

American teams really did themselves proud. There were four blue and white cars entered (not including the Walker Lotus!) and all four finished. Bob Drake kept the snarling 250F Maser well away from the back of the pack at all times, Pete Lovely did a fine job with a brand-new automobile, and Jim Hall showed he's a driver to reckon with on an international level. And the Scarab . . . if only the original schedule could have been maintained, and it had done this well at the Grand Prize at Sebring last year, Daigh would have been a force to reckon with in Europe in 1960.

The post-race inquest at Reventlow Automobiles Inc. was of great interest. Remember that the cars had always thrown oil from the breathers in earlier races? As never before, at Riverside, the engine ran solid and clean and kept its oil inside, leading to the tentative conclusion that during these two and a half hours the rings had bedded in properly for the first time! Chuck Daigh had to slow markedly toward the end because fuel starvation caused the engine to run very hot — water temperature off the dial and oil at 240 degrees.

This was, in any event, probably the last race for the original Scarab G.P. car. After the Riverside machine's engine had been examined, it was to have a new oil pan attached and would go right back in the chassis mounted vertically, to make sure it'll run that way before they put it in the new rear-engine chassis. The other front-engine chassis is having a fully-Scarabized Chevy V8 installed for Free Formula racing. Should be more than a match for Ferrari's Testa Rossa-engined G.P. car!

In November the jig was being built for the straightforward space frame of the new rear-engine car, which will be for the Intercontinental Formula only in 1961. The 2½-liter engine will be taken out to the maximum allowable 3 liters by enlarging both bore and stroke, and the new-type Cooper gearbox will be fitted to the first car. Later cars may use lighter boxes from the new alliance between Alf Francis and Valerio Colotti, created especially to serve the motor racing market. We were delighted to hear that work will proceed during 1961 on an all-new 1½-liter engine, to get R.A.I. back into the Formula 1 business by 1962.

Speaking of the Intercontinental Formula, John Cooper paid a visit to the Meyer-Drake plant on Monday after the race, with we-wonder-what on his mind. No doubt about it: after two Monza 500s and two American Grand Prizes, giving each side ample opportunity to examine the other's equipment and see they're all in the common business of building racing cars, we're on the brink of truly international competition on a grand scale. —*KEL*

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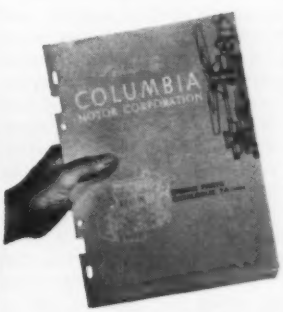

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MAINTENANCE FREE

Continued from page 27

Some plastic compounds are showing amazing capabilities for oil-less bushings in areas where loads are higher. "Teflon" — ceramic fibres bound by a plastic polymer and molded to shape — has been tested successfully under unit loads up to 100,000 psi, and it shows a very low friction coefficient of only .004-.005. This was first used as a bearing surface in the front ball joints of the 1958 Thunderbird. Teflon can do its job without lubrication, but it's susceptible to dirt and grit, so the grease is used more for flushing and sealing than anything else. Engineers are also wondering how far they can push Teflon in high-load areas. For light loads there's no problem, and Teflon's resistance to acids, salt, weather damage, etc., makes it very attractive.

Up to now we've been discussing ways of eliminating lubrication altogether. Many auto designers feel this is not the best route for the near future, with what little we know about the capabilities of rubber bushings and friction-resistant plastics. They think we should surrender and use grease lubrication — but concentrate on *sealing the grease in and the dirt out*, so the joint can be filled with grease on the assembly line at the factory and won't require attention again for many thousands of miles. This is what they've done on the new '61 Ford Motor Company and Cadillac lines. There are three basic differences from last year:

(1) The synthetic rubber seals for the various joints (front end ball joints, steering tie rod ends, etc.) are much more elaborate, expensive and highly developed. Space won't permit any discussion of seal design here, but it can be said that these new types are many times more effective than earlier seals in holding the grease in and keeping out dirt and moisture.

(2) The conventional grease nipples (Zerk fittings) used on these joints have been replaced by threaded plugs. For the very occasional lube job (every 30,000 miles or more) these plugs are removed and a special grease gun used to inject the grease through the open threaded hole. Then the plug is replaced. This gives additional sealing, as quite a lot of dirt and moisture can get into a joint through the conventional grease nipple. Incidentally, even though Cadillac advertises that no lubrication will ever be required on their new chassis, they also use these grease plugs — and dealers have already been supplied with the special grease guns, grease, and instructions for chassis lubrication!

(3) No ordinary grade of grease is trusted to do the job over these three-year, 30,000-mile lubrication intervals. A highly-developed lithium-base molybdenum-disulphide grease is specified, clay-filtered to remove every possible impurity. Lithium is a very light metallic element, softer than lead, that makes an ideal base for the soap used to thicken the oil. Molybdenum-disulphide has an affinity for metal, literally plates itself on the metallic surface and in the pores to give a friction-resistant coat even when the oil is gone. This compound is suspended in the oil before mixing with the soap. Expensive — but the engineers were afraid to trust ordinary grease for such long periods under all kinds of operating conditions. Maybe sometime soon they'll find these fears were ungrounded, and that such expensive, high-quality grease is not necessary.

And the overall result: we now have passenger car chassis that are, indeed, free from lubrication worries for at least the two or three years that the first owner normally keeps the car. This would also include the transmission and rear-axle fluid and the wheel bearing grease.

We might as well get it straight off the bat that Ford's bombshell of the 12-month, 12,000-mile warranty had *nothing whatever* to do with the new 30,000-mile recommended lubrication interval. In other words the new "sealed" chassis was not the trigger that encouraged Engineering to go out on a limb with the new-car warranty. No, this new warranty thing is a sales and publicity tool — pure and simple. The idea did not come from Engineering; it came from Sales. The Ford people thought the long warranty would boost sales and draw favorable publicity as an important industry innovation. There were no really reliable figures available to estimate how much extra it would cost, so they gambled.

Actually there's nothing new about the idea for a full-year warranty on new cars. At least two car makers have considered it seriously in the last three or four years, but rejected it because of the above reasons. As a matter of fact, General Motors has had an unadvertised 12-month warranty in effect since 1941. This was a confidential agreement with dealers to reimburse them for certain specified service work on new cars up to 12 months after sale. The buyer never knew about this deal. Let's say you bought a Chevrolet before the new '61 arrangement. Your written warranty was for 90 days or 4000 miles. Let's say the crankshaft breaks after you've had the car 10 months and there's 8000 miles on the clock. According to your written warranty you have no redress. But you take it back to the dealer and complain. He surprises you; he "stands behind the product", magnanimously replaces the crank, renews your faith in GM and your fellow man. Actually the Chevrolet factory will pay for the crank and installation, when billed by the dealer. The system worked very nicely for 20 years. It protected the dealer from factory engineering and construction goofs, and yet by not publicizing the deal they didn't have buyers coming back to the dealer with every little thing for a year after they bought the car.

Giving credit where it's due, it should be pointed out that *all* of the auto makers, even the small independents, have been willing to stand behind their products for at least a year — even though the factory-dealer agreement was on a less formal basis. Any careful owner who took care of his car and ran into major trouble had nothing to worry about — and the factory would pay the bill.

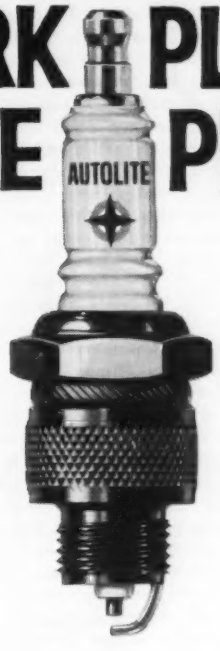
Recently Lincoln surprised the industry with a 24-month, 24,000-mile warranty on it's '61 models. The press release credited "strides in achieving our goals of quality and reliability" for the bold new offer, and went on to mention the elaborate inspection and test program introduced on the new models. (This includes dynamometer break-in of each engine, tear-down of all engines after break-in to check for defective parts, 12-mile road test of each car, complete electrical circuit check, etc.) The Lincoln people have a point. There is little doubt that they have the highest-quality car put out in recent times by the American industry. And it seems possible at this point that they will be able to enjoy the fruits of this radical warranty policy for some time yet. GM and Chrysler officials don't seem anxious to follow with their high-priced lines. One executive made the statement that his corporation didn't want to do anything to charge the first owner of a car for benefits that might accrue to the *second* owner. In other words, many buyers of these expensive cars trade every year; since the two-year warranty would have to add to the price of the car (more than twice as much as one year, in fact) the first owner would, in effect, be partially maintaining the car for the second owner! Some of the big boys don't want to get involved in any deal like that.

Some readers have asked how the "fine print" in the new one-year warranty policies compares with the earlier 90-day agreements. Actually there are no important differences. New-car warranties have always excluded certain supplier items like tires and batteries, which are guaranteed by the supplier (though sometimes the dealer will handle the deal), and they have never covered normal maintenance operations like oil and filter changes, chassis lube jobs, tire rotation, tuneups, etc. Furthermore a clause in the policy voids it if the owner neglects or abuses the car — for instance if he breaks up a transmission throwing a speed-shift. The dealer has to "play it by ear" on this one; maybe he can work out a deal with the owner and even get the factory service rep to okay reimbursement. It's all pretty informal. Actually a new-car warranty is no better than the dealer who sells the car.

Fancy warranty policies won't help one bit to bring tomorrow's no-maintenance car any closer to reality. Only down-to-earth engineering will do it. Right now we've pretty much eliminated chassis lubrication (the spread of the no-lube feature through the industry is only a matter of time). The sealed engine is not an impossibility. A few break-throughs in synthetic lubricants, crankcase ventilation, fuels, maybe transistor ignition, self-cleaning filters, etc., could do the trick, perhaps within six or seven years. Transmission, rear axle and wheel bearing lubricants are all but lifetime-rated now. We need merely assure against leakage. The 100,000-mile tire is on the horizon. Developments in metallic cord, new rubber compounds and mixing ingredients (like the late discovery of talcum powder mixed with carbon black), new shapes and tread designs make the "no-maintenance" tire a definite possibility. And lifetime brake linings should be no problem; some say we could have them today if the factories were willing to pay a few bucks extra for them.

Maybe the day will come when a dealer warranty policy is just a waste of paper. A new car may be driven off the showroom floor, pass through the hands of three or four owners, pile up a hundred thousand miles, and be driven into the junkyard — without ever being inside a garage or even having the hood opened! *—RH*

WHY ISN'T THIS SPARK PLUG CHROME PLATED



?

Almost everyone agrees, Autolite doesn't make the prettiest spark plugs in town. The new shiny kind are much more attractive. Obviously, there is a reason why these plugs are blue. The color itself doesn't make any difference. But it does tell you a lot about the way the spark plug is made. Example: The way the shell is sealed to the insulator. This seal guards against loss of compression, sluggish performance, poor fuel economy. In building its blue plugs, Autolite seals the shell to the insulator under tremendous heat and pressure. No plated shell could stand this treatment; it would crack, peel, discolor. Plated spark plugs are usually caulked with powder and the shell crimped to the insulator. Is this difference in sealing methods really this important? It is if you are an economy nut, or a performance nut, or just a guy who doesn't take chances on anything he buys for his car. Next time you need a new set of plugs, remember two things. For top performance and economy, the color is blue, the name is Autolite. Toledo 1, Ohio.

AUTOLITE.

TWENTY HOURS WITH A CHAMPION

Continued from page 53

board and chalk. Now the basic lines through corners are discussed, i.e., geometric ideal versus practical ideal. Then Taruffi, chalk in hand, arms gesticulating, explains one-hundred-and-eighty-degree turns at: 1. Constant radius, constant speed; 2. Varying radius, early acceleration and increasing speed.

While speaking Taruffi dives from English to French to Italian without faltering. He stops often to ask if he has been understood. The striking thing is that after thirty years of motor racing this man is still interested enough to be thorough with students whose knowledge is so much less than his own.

The next day, 8:00 a.m. Wednesday morning, everybody meets at the Autodrome for three hours of practical instruction — one hour for each student. With pylons Taruffi has set up an oval where the short runway for light aircraft joins the race course. The theory lesson taught the night before will be applied: one-hundred-and-eighty-degree turns of constant and varying radii. Proven to the students by a stop watch is the fact that entering a corner a little slower, in a tighter curve than the geometric maximum, then accelerating sooner, expanding the radius, will improve your lap times because you are entering the following straight faster.

During the lessons Mr. Taruffi stops the students, jumping into the car himself, demonstrating, correcting the student's method or style.

"You are so smooth and confident!" comments Inge Johnstone, the American student.

Mr. Taruffi's white, square teeth gleam in his suntanned face. He laughs and replies realistically, "You cannot do in two days what I have done in a lifetime!"

After driving, the charts are collected from the timers, one of whom is Isabella Taruffi, attractive ex-fashion-model wife of Taruffi. The students gather around, nodding their heads as they see their times are invariably better using Mr. Taruffi's methods.

The heat of the day sends Taruffi and students back to the Centro Sud classroom. He lectures on faster corners this time, stressing that slow or fast, the same principle is employed. Use of power and steering for setting up drifts when entering corners is discussed. Taruffi explains that if you enter a corner fast enough, "hanging out" the tail of a car can be done by momentarily lifting the throttle and cranking the wheel into the turn, then getting on the throttle just hard enough. He goes on to say that when a car decelerates, as when you lift your foot or use the brake, most of the weight of the car shifts to the front wheels. The tail is left light and without much adhesion, so that when you turn the steering wheel the tail goes out easily. Then, tail out just enough, when power is added again some of the weight is transferred back to the rear wheels, giving more adhesion and, ideally, the tail stops where you want it, "hung out." From there a fine and proper throttle technique will hold the drift just right.

After two hours for lunch, medium bends are set up where the runway for light planes meets the race circuit. At this hour quite a few planes are buzzing overhead and some of them want to land. To hell with those silly red racing machines!

Hawk eyes are kept on the sky and the first time Isabella Taruffi leaps up to yell "Aereo! Aereo!" in a smooth contralto, all maneuvers screech to a halt. The unlucky student skids off the pavement into the tall, daisy-laced weeds. Mechanics scurry out to collect menacing pylons and everyone waits, not overly sure the wavering plane won't clip his noggin.

Despite more interruptions from above, Taruffi manages to ride dual with his students, showing them how to negotiate the two corners, right and left, in both the right and wrong way. As in all things requiring co-ordination, sometimes Taruffi makes mistakes, but it's usually on the first try. His second attempt is nearly always quite good.

Again all three students try their skill. The first half-hour Taruffi tells them to use "seventy percent of the limit" and primarily to follow good lines with emphasis on power, smoothness, entry, clipping and exit points.

The second half-hour he urges them to go faster to "see what happens." When a student spins out he says, "See, it is good practice here on an airport with me! Not good later in a race!"

The highlight of the 5:00 p.m. theory lesson is the introduction of the "three-stage corner," a driving method evolved from a compromise between the best in theory and the best in practice.

Thursday morning, at 8:00 a.m., just before classes start for the day, the Autodrome seems infinitely vast and quiet in the ghostly haze which lingers, a remnant of dawn, over the smell of cut grass. The red brick of the far wall beyond the chicane is broken by a white insert, an unintentional memorial to Eugenio Castellotti, who fatally crashed here in 1957 while testing a Grand Prix Ferrari. Other stories ring back out of the mist, like the one about Mike Hawthorn leaving the road at the ninety-degree bend and going right on out the nearest gate.

Piero Taruffi and his three students congregate with the Centro Sud Maseratis at the fast bend, again, where the runway meets the race circuit. Taruffi sets up medium corners to the left and right, the same as yesterday. This time he suggests trying to negotiate them with speed and precision. "It is easy," he says, "to take the correct line when you go slowly."

The students begin taking turns and it's evident today that technique has improved. As soon as the student realizes the car is sliding out too far because of early acceleration and learns to prevent this, lines improve even more.

The following theory lesson is held under the hot sun on the Autodrome. This time Taruffi gives a thorough recap to each student on his lines and entry into the corners. The purpose is to prepare him better for the more difficult lesson to follow.

For it, the pylons are widened to form big corners with a radius about twice that of previous turns. Procedure remains the same, except for a faster entry. As you approach the corner you brake or decelerate, turn the wheel coming in with steady power, apply full power before the clipping point, letting sliding motion carry the car out to the edge of the road. As before each new step, Mr. Taruffi warns students to use "seventy percent of the limit."

A fourth student joins the class at this point. He is an Italian driving his own Stanguellini and he unwillingly provides fun for the other three by spinning out immediately.

Past midday, sprawling in the grass under the big Centro Sud umbrella, waiting for the last student to report after lunch, those present are given an unexpected insight into why Taruffi was called the "Silver Fox" by fellow drivers before retiring from international racing.

Someone mentions a recent unofficial time turned by the new Formula 1 Ferrari which supposedly beat the lap record at Modena. Putting down a bottle of *acqua minerale* he is gulping, Taruffi asks what the time was. When told, he immediately says, "Yes. That was the day the school started and beforehand the women had been around the course sweeping off rocks. That is enough to make a two-second difference in the lap times. I hope Ferrari realized this." Everyone smiles and has to agree. The "Silver Fox" is right, of course.

The afternoon session begins with spectacular spins because Taruffi instructs the students to take the big corners faster.

Fear — or lack of it — is a question now. The slowest student bobbles and snakes once, then backs off for the rest of the afternoon. Johnstone, fastest so far, is suddenly too rough on the controls and spins off widely into the grass.

"What did you say, officer?"

Between each run, at the turn-around area, Taruffi has each student slide the car around to build confidence that it is stable under power—unless the foot is lifted from the accelerator, in which case the offender spi-i-i-ns.

Thursday evening in the Centro Sud classroom, theory lessons concentrate on chicanes and multiple corners. Taruffi tells why it is sometimes better to take a line short of ideal in one corner in order to be set up correctly for one closely following. The students ask questions and receive direct, clear answers.

Friday morning is devoted to one half-hour of practice on the big corners of the day before. Everybody goes very fast, trying for speed as well as perfection. The lesson is a surprising success with no spins!

Later Taruffi takes his class on foot around the Autodrome, looking over each corner and showing how to find the best line and clipping point. Taruffi adds that it is essential to pick out rough or dangerous points, dips or bumps which change the cornering characteristics of the car.

The last day, Saturday, climaxes in five full laps of the complete Autodrome using "seventy percent of the limit." Then, inevitably, all restrictions are withdrawn. Each man is told in his own language to "go as fast as you feel safe."

Before the chicane and ninety-degree bend, Taruffi has constructed, in the interest of safety, a pylon chicane to slow down students as they approach the nearest point to the brick wall. Times are carefully taken and a one-second penalty is incurred if a student knocks over a pylon.

Johnstone, grimy and smiling, emerges the victor, having turned within three seconds of the lap record on "Taruffi's course," even with the several pylons he knocked down. Taruffi is not slow to congratulate, but warns that each clipped pylon could have been a brick wall. He glances toward the ice cream bar just outside the gate and announces that the American is buying an ice cream for each knocked-down pylon. Inside the bar, Mr. Taruffi will not let anyone stop with only one ice cream. He himself has three. When offered a glass of *acqua minerale*, he snaps, "No! It is too cheap!" and reaches for several pieces of candy. A singular way of driving home an important lesson!

Stuffed, the group returns to the Centro Sud building where Taruffi good-naturedly autographs copies of his book on motor racing and shakes hands with his students, directing toward each a warm good-bye.

Worth three hundred and twenty dollars a week? Graduates of the school think so.

"It's a very good school," one student says simply.

"There couldn't be a better teacher than Taruffi," another thinks aloud. "He gave us every kind of corner possible on the flat."

Johnstone comments, "Even though I had raced before, the school and Taruffi gave me more confidence. It made me think about racing analytically, as a science, which I had never done before." His eyes grow wistful. "I hope the next time around I'll be able to take the more advanced course in a faster car."

Taruffi, having given his best, looks ready to relax . . . meaning he hopes he never has to do such a good job again, in three languages. —*ABJ*

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STORM WARNINGS IN THE BAHAMAS

Continued from page 71

Bobby Allen of Miami, who guided his Xterminator over 100 laps, averaging 31.37 mph for the 50 miles. Second, also on an Xterminator, was Peter Berlt, of Huntington, West Virginia, while third was Tex Bell, of Glendora, California on a Go Kart. A total of 33 entered the finals after paring down the 198 entries in the earlier eliminations. Corky Stamper, of Miami, who had won the Junior title was disqualified for using an illegal powerplant. As a result, the crown went to Pierre Michel, also of Miami. Stamper's sister, Penny, lost her Class B Stock title for the same reason, with the win going to Carlos Peruneda, of Mexico City.

The sports car contingent got in its first licks on Sunday the 27th when Moss, driving a dark-blue Ferrari Berlinetta mopped up the 112.5-mile Nassau Tourist Race with an average of 83.56 mph. He got the jump at the start and easily outran the rest of the field with the R. Wilkins car, bettering Johnny Cuevas's Porsche Carrera Tourist Trophy record set last year. In second, almost a lap behind, was Bob Grossman, of Nyack, New York with a yellow Berlinetta.

Scrutineering (a wonderful word, that) occupied Wednesday, the 30th and practice claimed Thursday, December 1. Humid, partly cloudy weather gave way to a fierce squall that inundated parts of the course and forced postponement of the Governor's Trophy race from Friday to Saturday.

The feature race of the day, something of a prelude to the storm that was anticipated for Sunday in the Nassau Trophy Race, saw attention focused on Moss and his sickly-green rear-engined 2½-liter Lotus. After stalling on the starting line, he blasted from last to first position in just seven laps only to pull into the pits. At the time, he was circulating at over 92 mph, three miles per hour faster than Ricardo Rodriguez in his three-liter Ferrari which eventually won.

Moss explained his spectator-mystifying antics by saying he was merely testing his car for Sunday's feature. He said he had not been satisfied with the gear ratios and was trying to determine fuel and tire use figures. Rodriguez clinched the Governor's Trophy at 89.34 mph for the 112.5-mile distance, falling short of the 90.12-mph mark Moss had set for the event last year in an Aston Martin.

Though he defeated 49 starters, Ricardo had no delusions about the International Trophy fight that would occur the next day; he realized cars and drivers were not pressing to the limit, not wanting to risk everything before it was absolutely necessary. The 18-year-old held a 29-second margin over Gaston Andrey, of Framingham, Massachusetts who was driving a white and red Birdcage Maserati. Third in the Governor's Trophy dash was Bob Holbert, who also nailed down Class E honors. Penske, in another Porsche, and Bill Sadler in his white and blue special rounded out the top five. The big, black Kelso Chevy Lister-Corvette, piloted by George Constantine, winner of last year's feature in an Aston, had bored into first place on the first lap only to whistle off into the underbrush.

The climactic Sunday arrived, bringing with it the running of the Pan American Formula Junior Championship won by Jim Hall, of Dallas, Texas in a Cooper. He outpaced other machinery at a speed of 85.04 mph, his triumph giving Cooper a total of 32 points in the four-race series. Earlier races for the Championship had been run at Savannah, Georgia; Daytona, Florida and Riverside, California. His win also staved off a Lotus sweep as they grabbed the next five positions. Pat Pigott, who had won two earlier heats, was second, trailing Hall by but a few seconds over the line. In third was another Texan, Hap Sharp, then came Harry Carter, and Dick Macon, of Fairhope, Alabama. In the manufacturers' tallies, it was Cooper 32, Lotus 30, Elva 8, Stanguellini and Isis, 4 each, Wainer and Dolphin, two each and Gemini, one.

Competitive appetites whetted, the cars were lined up for the Le Mans start of the International Nassau Trophy Race, their drivers opposite them. One driver was stretched full length in the warm Bahamian sun. The start was over in an instant; drivers sprinted, engines roared to life and arcs of hot black rubber indicated which way the traffic went — which way it went but for Moss. For the second time, his Lotus had balked and he required a push start. However, he wasted no time and picked up eight places in his first fast thrust down the 3800-foot Sassoon straight. Rodriguez, meanwhile, burned a 175-yard lead on the first lap. Gurney pressed hard in second, Sadler, third and Sharp, fourth. Infighting back in the pack was furious.

Moss was driving relentlessly. Then, as the Lotus swung into Crise's Corner, an A-arm collapsed and the front end of the car hit the road, virtually disintegrating. Jo Bonnier said later the hood flew over his Porsche. For Moss, whose hopes were keen on becoming Nassau's first three-time winner, it was all over before his first lap was completed. He had gone into the race the acknowledged favorite; what would have happened if he had stayed in would be pure speculation.

Sadler nursed his car into the pits on lap five. Jeffords stopped his Birdcage briefly to fix an unbolted brake pedal; Rodriguez upped the average to 88.77 mph. Paul Hagan parked his Deutsch Bonnet at the esses; Dr. James Miller, of Birmingham, Michigan spun and stalled his Lotus on Windsor Way and Constantine took a big slide into the bushes.

Ricardo, by the tenth lap, was still in front running like clockwork with Gurney in hot pursuit. They were followed by Hall in a Birdcage; Sharp (Ferrari), Jeffords (Maserati), Bonnier (Porsche), Andrey (Maserati), Penske (Porsche), Constantine (Kelischev) and Holbert (Porsche).

Rain fell on the 11th lap, one that Rodriguez recorded at 90 mph on the nose. He toured the 13th at 90.5 paying no attention to the rain and Sadler got back in the fray after 12 minutes in the pits. At 20 laps it was still Rodriguez with only the top ten cars on the same lap as he. They were Gurney, Hall, Sharp, Bonnier, Andrey, Holbert, Constantine and Alan Connell (Maserati). Constantine pitted on the 24th lap with transmission trouble. Starting in fourth, the only gear he had left, he continued until the 27th lap. More rain sprinkled down on the 28th lap; it lasted about 5 minutes during which the pace continued virtually undiminished. Grossman experienced engine trouble in his Berlinetta which had done well in the opener the week before and Rodriguez turned the 31st lap at 91.01 mph. On the previous lap, Bonnier displaced Sharp in fourth position. Another Swede, Ulf Norinder, moved up into eighth. Brian Naylor held ninth in his Cooper-Ferrari and George Reed nipped his Ferrari Berlinetta into 10th.

Car and driver troubles persisted. Durant spun his Ferrari at Esso Bend and, but for quick helmsmanship, Rodriguez's race would have ended right there as he slipped by the wildly gyrating coupe. Art Huttinger reported clutch trouble with his Lister Corvette; Art Swanson zoomed off-course at Prince George corner and walked back to the pits; Tom Fleming stripped the gears in his OSCA and rode back in a truck; faulty steering punctured Naylor's hopes.

Rodriguez, his Ferrari sounding as healthy as ever, upped his lap speeds to 92.57 mph as Gurney started nibbling at his lead, cutting it from 57 to 7 seconds. The fateful 40th arrived. Rodriguez pitted. Pedro was helmeted, set to continue the fight and waited as the seconds — and Gurney — sped past. Ricardo commented later the car was going well and said that at no time did he have the Ferrari all the way out. From there on, it was all Gurney. He was 75 seconds ahead of Pedro by the 43rd lap. On the 44th, Andrey passed Bonnier for fourth place, only to be repassed on lap 45 when Gurney had an 83-second advantage and an average speed of 89.93 mph. Only the top seven cars were on the same lap as the leader.

Gurney was racing against the clock and fast failing light, as officials had announced no lap would be started after 5:15 p.m. The 50th lap passed with Gurney averaging 89.74. Percy Hollins, of Jamaica, brought in his previously steady-running Lotus Elite (the only one entered) with a leaky brake system. It was apparent the time deadline would beat the winner and thus the race ended at 55 rather than 56 laps.

Jim Hall can perhaps claim the unofficial hard-luck trophy. The Dallas driver had held his Birdcage Maserati steadily in third spot for the duration of the clash, only to go off-course with faulty steering as Gurney completed his last lap. As a result, he was listed NRAF — not running at the finish — and out of the money by officials.

The rubber, oil and fuel fumes gave way to crisp air conditioning. Grimy drivers, their smudged wives and girl friends, harried, tired mechanics, weary timers and scorers showered and changed. The roar of the cars gave way to the clink of glasses. Trophies were passed out, cash awards made and the circus moved on, leaving room on the beach and at the bar for the next wave of visitors to inundate the island. Speed Weeks was over, but The Season was opened with a bang. —*HW*

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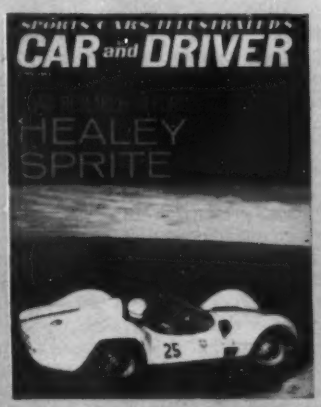

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K3 MAGNETTE GOES WEST

Continued from page 33

of it. In the sort of weather you expect and usually get in England in September, i.e. nonstop rain, he averaged 93.35 mph and placed eleventh. Apart from scheduled fueling stops, Martin lost over four minutes when an unspecified number of plugs went out.

Sixth placement in the Nuffield Trophy road race at Donington Park in October of 1934 sounded K3025's racing swan song, whereafter its owner, grown to man's estate and on the lookout for a mansize automobile to prove it, bought and raced a 3.3 G.P. Bugatti. Charlie has no recollections of what happened to the K3 during 1935 and '36, so presumably nothing did. The second owner, Robin Jackson, who was later to play a leading technical part in the development of EX135, all-time's fastest and most famous K3 derivative, can't recall putting it to work either. Which brings us to owner number three, a Mr. W. E. C. Watkinson of Hanley Swan, Worcestershire.

Mild-one-becomes wild-one transformations abound in SCI's pages, but Mr. Watkinson had different ideas. He'd bought a wild one and he wanted it mild, or anyway milder, and certainly a lot more habitable. To this end he had the engine detuned for street use, then turned the car over to Jensen Motors Ltd. of West Bromwich with instructions to build and fit an entirely new two-seat sports body he'd designed. Cost seemed to be no object with Mr. Watkinson, and the whole makeover took 21 months to complete, January 1937 to September '38.

Between the latter date and the outbreak of WW2 a year later, the incognito K3025 was used for road motoring but not for any kind of competition. When the war began, Mr. Watkinson swaddled his fast toy away and the next time its wheels revolved was in 1953. He then delivered it to MG at Abingdon and ordered a complete mechanical overhaul, again on an *ad lib* cost basis. Even minutely worn parts were scrapped.

To judge from the fact he hadn't bothered to retrieve the car six years later, Mr. Watkinson's enthusiasm for his Magnette seems to have cooled with advancing years. Many visitors to MG, glimpsing the still resplendent relic as they made the rounds of the factory, paused awhile and nodded nostalgic or approving or covetous nods, according to their natures. And finally, in September of last year, one particular visitor went further than just nodding. He was Mr. Kjell Qvale, president of British Motor Car Distributors Ltd., MG distributors for Northern California. What he said was, "I think we should have it." Mr. Watkinson was forthwith contacted, he agreed to sell, and on learning of Mr. Qvale's intention to restore the car to original specification, remembered he still had the prewar racing body lying around somewhere. This was accordingly included in the deal and consigned to Abingdon, where the task of turning the clock back was entrusted to the firm's Show Shop.

Efficient liaison is the key to success in a project like this, where an ocean and a continent stretches between the customer and the transformation job, and Mr. Qvale was lucky in having just the right man available and on the spot. For the go-between role he enlisted his firm's English agent and correspondent, Mr. James Watt of James Watt (Motor Industry) Ltd., Wraysbury, Buckinghamshire, who in the course of a distinguished career has been associated with Aston Martin, Healey, Bristol, Arnolt, Lodge and other concerns.

K3025, it will be realized, hadn't run under its own power, apart from a brief test sortie, between the completion of the 1953 rebuild and the day, six years later, when Mr. Qvale mused, "I think we should have it." The restoration job did not therefore entail any further work on the engineering entities, which, aside from carb settings, a drop in compression ratio, and the fitting of plugs that wouldn't be constantly oiling up under street conditions, were anyway just as they'd been in Martin's day. This explains why operation as-you-were was mostly a matter for MG's Show Shop, which as its name implies is primarily concerned with the preparation and beautifying of cars for exhibition. There were a couple of vital chores, though, involving outside aid for Show Shopmen Tim Binnington (underforeman), Lofty Mansell and Les Washbrook: to counterfeit a 1934 pattern K3 gas tank and Brooklands-type exhaust system, longstanding MG artisan Wilky Wilkins was called in. Wilky, a sheet metal craftsman of the highest caliber, had built the streamliner body for Goldie Gardner's 200 mph EX135, back in 1938. Original drawings of the tank had been preserved on microfilm, and minute particulars of the Brooklands exhaust plumbing survived at Abingdon in the form of declaration blanks that all entrants used to be required to fill and sign before exposing the eardrums of the old track's neighborhood residents to racing noises. The odd-looking expansion chamber and wide splayed fishtail presently adorning K3025's left flank doesn't just *look* like a regulation Brooklands phontrap — if Brooklands ever went into business again, which is hardly likely, K3025 could be guaranteed to pass the official silencer scrutiny.

Shifting focus from lesser to bigger wheels, it was thanks to the enthusiasm of John Thornley, director and general manager of MG, that Kjell Qvale's vision was translated into action, and personal responsibility for seeing it through in accordance with the Qvale-Watt image was vested in Mr. Cecil Cousins, who was the first employee ever signed on by MG and is now its factory manager.

While the restoration was in progress, James Watt managed to locate Charles Martin, whose connection with racing has long since ceased, and arranged for him to visit Abingdon on an appointed day and renew acquaintance with his old love before its crating and shipment to San Francisco. Charles duly showed and was accorded the privilege of driving the Magnette, perforcedly at sub-500 speeds, around the factory precincts.

"Indistinguishable from new", a phrase used with varying degrees of license by English advertisers of used cars, scarcely does justice to K3025's almost clinically pristine appearance when Tim Binnington and his boys had finished with it. The British racing green paint job shone with a flawless luster. The plated parts glinted and sparkled in the wintry Berkshire sunshine. You could have eaten your dinner off the seat upholstery and cockpit floor. The constellation of dash instruments peeked out with shining morning faces from the shadow of the assymmetrically curved scuttle cowling. Every control worked with hi-fi precision, unsullied by backlash or lost motion. The job had been worth doing well and that's how they'd done it. Their labors had been lightened, of course, by the fact that this car, though far gone in years, still was a toddler in mileage terms. By James Watt's estimate, which presupposes Mr. Watkinson's 1938/39 travels weren't exactly farflung, it only has about 3000 miles on it to date, including the 1656 it knocked off at Le Mans.

The K3 was a straightforward and simple piece of machinery but with a few interestingly deviationist features. On the threshold of an era in which the German G.P. car designers would throw tradition overboard and daringly pioneer racing springs that sprang and chassis frames that didn't, the Magnette frame and suspension stayed in a well-worn groove. The chassis, that is to say, was the usual channel structure, heavy without being particularly rigid, and the springs were semielliptic at both ends. Up front, the side members surmounted the axle to form dumbirons; at the back they passed under the live axle. To resist lateral play, the springs pivoted on bronze-lined bushes in front and slid in trunnions in rear. Damping was by friction-type Hartford shock absorbers all around, though K3025 deviated from stock in having Telecontrol Hartfords, enabling the settings to be varied from the cockpit while in action. Front axle movement was controlled and brake torque contained by steel cables.

Novelty was confined to the steering gear, brakes and transmission. The former, in an attempt to abate a conflict of forces set up — steering tackle *vs.* front axle assembly — when both were trying to perform geometrically irreconcileable antics simultaneously, was endowed with a center slave arm and dual track rods. This departure, foreshadowing developments that were to become regular practice in the upcoming i.f.s. era, definitely worked, banishing much of the soggy feel that was inseparable from the established layouts transmitting the steering force first to the left side wheel, then back across the frame via a single track rod.

K3 brakes, from start to finish of the modest production run, were of the enormous diameter seen in our K3025 photos, cable operated and with magnesium alloy drums and backplates. The early K3s also had magnesium shoes but these proved short on rigidity and were replaced by T-section mild steel jobs before the Qvale car came into the world. Another change made at the same time was to substitute steel for cast iron as drum liner material.

The K3 engine was a six measuring 57 x 91 mm, with an iron head and block, four-bearing crankshaft, two in-line but slightly inclined valves per cylinder, operated by rockers that in turn were rocked by a single o.h. camshaft. Camshaft drive was at the

front, with spiral bevels top and bottom of a shaft that also directly served the vertically-mounted generator. All ports were separate and each valve was closed by a triple spring cluster. Nominal compression ratio was 6.4 to one and the Roots-type Marshall blower introduced in 1934 gave a maximum boost between 10 and 13 psi; the Marshall, like the eccentric-vane Powerplus supercharger used on the earlier K3s, was driven off the nose of the crank and nested between the dumbirons. Source of engine lubrication was a finned magnesium sump with a capacity of 2.3 U.S. gallons, with its level automatically maintained by a float device connected to a separate tank on the firewall. Ignition was by polar induction magneto and 14 mm spark plugs.

With the more efficient but less reliable Powerplus blower, 124 bhp was developed at 7000 rpm. In conjunction with the normal 6.4 to one compression ratio and the No. 85 Marshall blower as fitted to K3025, output came down to 115 at 6500, and further down again to around 105 horse with the combination of a Marshall and the alternative c.r. of 5.4 to one. Valve crash, the operators' manual warned, was liable to set in at 6500, and it isn't clear how the power curve contrived to go on climbing above this point despite valve crash with the Powerplus in use.

Following an example set some years earlier by Malcolm Campbell, who tried the experiment on a V12 Sunbeam he raced on road and track, MG adopted an epicyclic preselector gearbox for the K3. It weighed more and friction losses were higher, but the choice was based on the assumption that these handicaps would be more than counterbalanced by the manipulative advantages of the preselector. As this term implies, you made your shifts — using a little quadrant-mounted lever — during lucid intervals when you didn't necessarily need both hands on the wheel, then effected the actual engagement by prodding a pedal equivalent to a normal clutch.

There were two possible pitfalls, transmissionwise. One, you had to remember it was just as necessary to pump the throttle during downshifts on the E.N.V. system as with a crash box; if you didn't, you soon had an expensive epicyclic jigsaw jiggling around in the bellypan. Two, when towing the car with a dead engine it was vital to disconnect the propshaft, the oil pump supplying the gearbox being driven off the engine.

The back axle was of three-quarter-floating type, with straight-tooth bevel final drive. Sundry rear end ratios were available, the toothing on K3025 giving 16.6 to one in low, 9.78 to one in second, 6.65 to one in third, 4.89 to one in top. Wheels were 19-inch Rudge Whitworth knockons with 4.75-inch Dunlop Fort tires. On the early slab tank cars the spare wheel or wheels were mounted right aft at the slope, *à la* TC and TD Midget. The later narrow bodied models like K3025 must presumably have slung the spare outboard at right of the cockpit, where carrying a spare was obligatory.

Thus was engineered the full cycle of transformations of K3025, now nested 6000 miles from its Abingdon birthplace. The only reason its San Francisco landfall wasn't accorded a 21-gun salute is that Kjell Qvale doesn't have 21 guns. —*DM*

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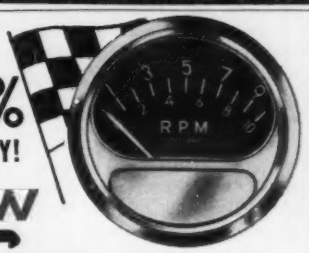

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ROAD RESEARCH REPORT: PONTIAC TEMPEST

Continued from page 62

The output shaft from the engine and input shaft to the gearbox both incline downward toward the center of the Tempest, to a total out-of-alignment of 11 degrees. The "sagging" shaft meets this misalignment, curving up at both ends from a depression at the center of about three inches. A certain amount of preload is required to assemble the shaft in its twin steady bearings and rigid housing; it won't bend that amount of its own weight. Use of the shaft, of course, eliminates the expense and service needs of the three universal joints that would be needed to get the same effect, but it's not known whether the costs of the two alternatives are comparable.

SHAFT IN ACTION

Pontiac states that in the extremes of normal operation the shaft does twist up to 30 degrees, implying a total drive line flexibility of 60 degrees, or ⅙ of a shaft revolution. This is certainly more flexibility than any other drive line *per se* allows, but, in terms of overall drive system behavior, it's very much comparable to the amount of flex allowed by the "windup" of a conventional Hotchkiss or leaf-sprung live rear axle. Pontiac may, in fact, have wanted to use this effect to remove the harshness sometimes experienced with chassis-mounted drive lines. Remember, though, that axle movement can be damped by rubber or proper shock mounting, while twisting of this shaft can't easily be damped.

In every respect we could measure or observe, the automatic transmission on the Tempest completely masks this flexibility of the drive shaft. The standard box, on the other hand, seems to point it up. Do many of the things that you *shouldn't* do with a car, but sometimes do in error: forget to disengage the clutch when coming to a halt, let it in suddenly from rest, start the engine with the car in gear, or push the car to start it — do these things and you'll detect a whipping motion that can be attributed to the shaft. Back off sharply on the throttle when cruising fast, also, and you feel a barely perceptible secondary surge in the Tempest's forward motion that could only originate in the undamped shaft.

From the standpoint of noise, again the automatic-box version was superior. One major problem of a transaxle layout is that the drive shaft must run at engine speed at all times since it connects the engine and gearbox, rather than the gearbox and final drive. (A compensating advantage, especially attractive in this design, is that the shaft need transmit only engine torque, never the multiplied torque delivered by the transmission.) In the automatic-box car it's *always* spinning when the engine is, in the standard-box car only when the clutch is engaged. In either installation the worst noise condition might be expected to be in neutral, when the shaft runs as free and loose in its bearings as it ever will. Indeed, with standard shift in neutral the shaft does make a quiet but insistent whirring sound below the floor. Perhaps because the oil and clutches in the automatic box exert a slight amount of drag and hence damping in Neutral range, the shaft is inaudible in that installation.

That's the sum total of the shaft's behavior. If you have an automatic-shift Tempest, you'll never know it's there. If you have a standard shift you will know it, under unusual conditions, but you'll never be inconvenienced by it. In either case it provides, with a low floor, an absolute minimum of maintenance for a front-engine, rear-transmission automobile. Lastly: we tried like hell, but we couldn't break it.

ENGINE-GEARBOX COMBINATIONS

Tempests come with five different power ratings, ranging from 110 to 155 bhp. The cars tested marked the two extremes and either way there is plenty of torque and lots of getaway. Any Tempest at all has more dig than any of last year's compacts. The reason is simple: the engine is big. It may sound modest when called "half a V8" so just think of its 3.2 liters as two MGs or two Volvos, a lot for only four cylinders.

Our acceleration times are very close for the two cars, more so than the leveling affect of the automatic should account for. Evidently we got a very good 110-bhp stick and an indifferent 155-bhp automatic.

One drawback of the big four is its incurable inherent vibration. When you realize each piston is over four inches across and the stroke is nearly that at 3¾ inches, you can appreciate that the vibration is going to be noticeable no matter what methods the engineers use.

These vibrations give the Tempest a European feel which is acceptable within modest limits. But on both cars it became quite harsh around 70 mph, making this speed uncomfortable for cruising.

There are two transmissions available for the Tempest. There are six engine choices but also only six combinations. Let's put it this way: the cars with automatic get a hotter camshaft which gives 20 bhp more at 4400 rpm instead of 3800. You have your choice of compression ratio, high or low (10¼ or 8.6 to one) which adds 10 bhp. If you choose the automatic with high compression, you can also get the four-barrel carburetor. It adds 15 bhp and 400 rpm, raising the total to 155 bhp at 4800 rpm.

The differences in the two camshafts are marked as the following indicates:

Timing with manual shift

	Intake	Exhaust
Opens	14° BTDC	48° BBDC
Closes	58° ABDC	24° ATDC
Duration	252°	252°
Overlap	38°	
Lift	0.330 in	

Timing with automatic shift

	Intake	Exhaust
Opens	30° BTDC	77° BBDC
Closes	63° ABDC	25° ATDC
Duration	273°	282°
Overlap	55°	
Lift	0.400 in	

Judging from our sampling of the extremes, you will find that this particular "senior compact" easily leaves its juniors behind at a stop light. Though the Tempest is no lightweight, scaling a ton and a half, its 195 inches get it moving with enthusiasm.

MANUAL TRANSMISSION

The indirect gears are startlingly noisy whether you're accelerating or cruising slowly in them. The reason for so much noise, we suspect, is that the torque tube which rigidly connects the transmission and engine transmits the sounds too faithfully to the integral body overhead. Accentuating the situation, we found that below 25 mph in high gear, the 110 bhp four was rough and thumpy. Slowest comfortable speed in second was about half that with the undesirable result that under 10 mph you are on the horns of a slow-moving dilemma: lump your way out of it in second, or take a swing at double-clutching into first. Though the gearbox arrangement is like the Corvair, the forward gear ratios are the same as in a Chevy six.

Selecting a "green-line" speed for the manual-shift Tempest proved difficult. The engine seems very flexible in bottom gear, pulling smoothly from about 2 mph or as soon as the clutch was firmly engaged. But in second and third, while the Tempest would creep along smoothly with the four cylinders just idling (at 6 and 11 mph), full throttle could not be used smoothly until 13 and 24 mph respectively. In neutral the engine idles at 650-700 rpm but in gear the rolling drag cuts it to about 500 rpm. Based on the second-third-gear performance, we've put the "green-line" at 1000 rpm, though we must admit that in low and reverse the engine is far more flexible than this would indicate. In the Speed Range section of the performance graph, the shaded area indicates speeds usable with part-throttle opening. This innovation for manual transmissions is in keeping with the indications used previously for automatic transmissions and will be reserved for cars such as this where there is a large difference between speeds which can be endured smoothly at any throttle position and at full throttle.

SPLIT TORQUE

Pontiac's TempesTorque is a kissing cousin to the Corvair's Powerglide. Most of the components are generally identical, yet by a subtle change to the high-gear clutch the TempesTorque incorporates the split-torque principle for greater efficiency while cruising.

You can't see the split-torque mechanism but when you drive the two-speed automatic you can feel its effect. Shifts up from low to high occur anywhere between 10 and 45 mph, depending on throttle opening. In either gear the engine speed seems to be closely tied to car speed, behaving in general in a high-geared, mechanical way, even when you mash down on the throttle and all four venturis start gulping air. When it's cold, the four-barrel engine hesitates and falters at first as it can't quite take having its second pair of venturis opened up wide.

If you press down below 40 mph, the automatic downshifts into low quickly, but not instantly. If you use only partial throttle, there is an awkward pause after the downshift before the engine speeds up to match the 82-percent-lower gear.

The specs indicate that the wide-open throttle upshift speed is 50 mph but on our car it took place at 45 mph. For our acceleration runs we ran the automatic out to 57 in Low and then manually shifted it

down to Drive; any faster and the engine just flattened out.

In the manual-shift Tempest, it is easier to beat the synchromesh than in a similarly-equipped Corvair; here is why:

Since the clutch is at the front, the drive shaft is an extension of the input shaft of the transmission. Every time you shift between second and third the synchromeshes have to bring the long shaft to the correct speed in addition to the clutch disc and the input shaft itself. On the other hand, double-clutching into first was mastered with no more than the usual difficulty.

WHICH TO CHOOSE?

Our conclusions are that the automatic is far and away the preferred box for a Tempest. It is quieter at all times, you get 20 free horsepower, any oscillations in the drive shaft are completely hidden, and it felt better in hard cornering (despite the power steering). Why? The automatic weighs more, which puts a few more pounds at the rear, and, because there's no clutch on the flywheel, takes even more off the front. While it is more expensive, the usual complaint of excessive gas consumption is countered by the split-torque arrangement of the transmission. The differences between our two test cars' mileages was negligible, a remarkable fact in itself. Considering the acceleration of the two Tempests, the actual mileage achieved, 17 to 21 mpg, is very impressive.

SUSPENSION AND STEERING

The ride is very soft and comfortable; you are unable to sense the individual irregularities, yet there is no unreasonable pitching through dips. This is achieved through front springs only 60 percent as stiff as usual at a wheel rate of 75 pounds per inch. Add to this the nose-heaviness and the mere 5½ inches of ground clearance at the front and you have a car which bottoms out a bit easily. We made a terrible clang entering an underground garage at 15 mph and subsequently found that rough roads traversed at speed would also make the front suspension bottom out. The rear suspension has two inches more clearance, a point we shall get back to.

While the official specifications published by Pontiac state there are 4½ turns of the wheel from lock to lock, we counted 6.4 turns on both the cars tested. We don't know what to make of such a discrepancy. Both test cars, one with power steering and one without, were the same, with about 5½ or more easy turns of the wheel, and if you really leaned into it you could eke out 6.4 turns. We checked at the front wheels as well to make sure the last bit was useful rather than bending the linkage. It was, and our figure for the turning circle diameter at least shows an appropriate improvement, viz., 36½ feet on the car with automatic transmission and power steering, and 36 feet right and 40 feet left on the other car. The specs state 41 feet.

With its slow, easy steering, the Tempest drives just like any American car. It's always smooth and gentle; bumps and chuckholes are not signaled through the steering wheel, yet on the other hand it is never vague about the grip the front tires are maintaining. The 15¾-inch wheel is positioned well clear of the seat cushion,

(*Continued on page 88*)

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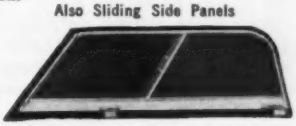

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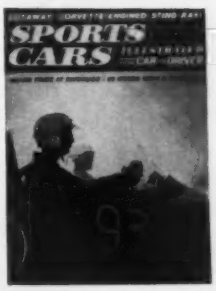

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(*Continued from page 87*)

(far enough away from your chest to encourage holding the wheel with both hands symmetrically) yet never intrudes in your line of vision. Our only complaint is that you have to turn it so far for even gentle bends in the road.

The Tempest shares another of the Corvair's complaints, the abrupt loss of adhesion at the rear wheels at the limit, especially when the rear seat, trunk and gas tank are all nearly empty. When you really lean the Tempest into a corner, the side force on the wheels pushes the outside rear tire in and therefore down, thus jacking the tail of the car up. Once you're in this "pole-vaulting" stance, you stay there until the corner is over.

Behind the wheel you aren't sure exactly what's going on behind you, but at the extreme limit the tail finally swings quickly out and you have to pay off helm to avoid climbing the inner curb. Unless your reactions are lightning fast, the slow steering makes it nearly impossible to hold the car steadily in this unstable, oversteering stance. Interestingly, this behavior could be attributed entirely to the suspension layout. The Tempest has none of the Corvair's "tail-heavy" feel, yet behaves very much the same at the limit of adhesion.

EXPERIMENTS WITH PIRELLIS

Partly because we suspected the sharp corners between tread and sidewall aggravated this sudden transition from fast cornering to too-fast cornering, we asked the Pirelli sales office in New York to lend us a set of 165 x 15 Cinturatos. Using the same stick-shift Tempest, we examined the Steering Behavior on the SCI 400-foot diameter Test Circle in three different configurations, with Firestone 5.90/6.00 x 15s all around, with the Pirellis all around, and, finally, with Pirellis on the rear and the Firestones on the front. We used 22 psi in all tests; in the case of the Pirellis because it seemed to give the best handling, in the case of the others because it is the factory-recommended pressure.

Like the Michelin X tires, Cinturatos have several extra plies along the tread and rather few across the sidewalls. Unlike them, however, no metal is used. The generic terms for the type of construction are braced-tread or belted tires. They have three strong characteristics: when correctly inflated, they look flat due to the relatively low pressures and the very soft sidewall, and the stiff tread, despite this, reduces the "enveloping" power so that the ride is noticeably firmer (unless the suspension is designed from the start for such tires). Finally, and most interesting to our readers, belted tires have extraordinary cornering stiffness; that is, they develop a given cornering force at noticeably smaller slip angles.

The first effect you notice when you mount them all around is that they quicken up the steering. On the Tempests, this was all to the good. One of our aims in fitting the Pirellis was to isolate the chassis's behavior, which seemed very pleasant at first, from that of the original-equipment tires. In this we succeeded, finding a noticeable improvement in behavior yet noting again the final oversteer when pressing the car to the limit. The rounded edge of the Pirelli tread made the transition into the "pole-vaulting" stance much smoother, vastly reducing the arc through which the driver has to make corrective swings of the wheel. The increased cornering stiffness tautened up the initial understeer characteristics. For instance, the steering wheel position formerly required for maintaining 20 mph around the test circle was adequate for holding 30 mph on Pirellis. We tried running higher pressures in the rear tires when shod with the Pirellis but found that even two extra psi made the inside rear tire "stutter" once the car was in the "pole-vault" attitude.

An interesting variation was to run the Pirellis on the rear only. While this softened the steering undesirably (at 30 mph more lock was required than at *any* speed in the other configurations) it had the notable advantage of eliminating the final oversteer. It was still possible to toss the rear end on tight corners, but it took a definite effort.

A superior solution to avoid final oversteer would be to decamber the rear suspension, though this may cause ground clearance problems if you load the trunk and rear seat fully. There already is an anti-roll bar in the front suspension, added very late in the car's development. Putting on a thicker one would increase the initial understeer, requiring even more lock than is now needed, probably without even affecting the "pole-vaulting" at all.

In all configurations, the steering forces, though light, seemed in reasonable proportion to the position of the wheel. The quicker steering with the Pirellis was paid for, albeit cheaply, by slightly greater forces. We've written at length about limit behavior because it's so complex to describe. As we mentioned, in normal driving the Tempest's steering is just like any American car's, soft and smooth.

The nine-inch brake drums are the same size as those on the Corvair, and the shoes are equally wide to give identical swept area but are shorter to give less actual lining area. They were always smooth and even in service except that the 155 bhp car began to fade a touch at the end of our acceleration runs. The parking brake pedal needed a healthy push to set them firmly when on an incline.

THE DASHBOARD

An effective hood really keeps the dash lights from reflecting on the windshield. Further discouraging reflections is the matte finish across the top of the dash, something advocated by experts for years. The speedometer has a needle which moves through an arc, a too-rare feature today. It's vastly easier to read at a glance than the red-stripe variety. The odometer reads in tenths but is not resettable. To the right is a fuel gauge which is only normally pessimistic. The only tie with the traditional Pontiac heraldry is a charmingly subtle one. The opening for the high-beam warning light is cut in the profile of the old chief himself.

The glove compartment scored 200 percent on the Rollei test but we liked best the cup-size indentations in the lid for use at the drive-in. If you can't put your Tempest in a teapot, at least you can put teacups in your Tempest.

A button in the middle of the wiper knob starts the electrically-pumped windshield washer fluid and, through the customary connection, turns on the wipers. The water jets up in spurts with the passing of the blades. After a time the washer shuts itself off, leaving it to you to stop the wipers when you've decided the windshield is clear.

AIR—HOT AND COLD

The heater has three controls, all conveniently to the left of the driver. They are all levers working vertically. The left one is the fan blower switch with three speeds, only the last of which is objectionably noisy. The resultant breeze should be adequate to melt icicles in Minnesota. The next lever sets the valve in the hot water system, controlling heat output. It was sticky in operation on both test cars but not on others we have seen.

Generous fresh air-ducts by your feet supply summer ventilation. They are identical to those found on other GM cars and are controlled by separate knobs under the corners of the dashboard.

We mentioned elsewhere that the engine is somewhat slow to warm up; this is not applicable to the heater system, which cuts the winter chills in less than a minute. There is no recirculating air arrangement and no need for one.

MAINTENANCE

Under-hood service looks to be a snap. Everything that used to be buried in the crotch of the big V8 is now laid bare on the flank of the big four. Everyone who checked the oil commented on the accessibility. The hood latch is under the front bumper. With all the space available, it's good to see some of it used for a giant-sized container for the windshield washer water supply.

The trunk, located at the rear, is very generous. Its volume is quoted at 27½ cubic feet, which is only 10 or 20 percent less than full-sized American cars have. The floor is wide and flat, though a good bit is taken up by the spare. An unusual but simple-to-operate jack is strapped to the right fender well to keep it from rattling. It does not rely on the bumpers to lift the integrally-built car, nor does it require reaching 'way under the car. The base it makes is very wide and you never need worry about the Tempest falling off its jack. The jack handle doubles as a lug wrench, which is typical practice here.

REVOLUTION THAT REFRESHES

In every way the Tempest is a wonderfully refreshing automobile. Under the hood and below the floorboards is a generous helping of imaginative engineering that produces an automobile of great product distinction. In standard-shift trim its propulsion is rugged and thrusting if not ultimately refined; as an automatic it moves with smoothness and directness that's reflected in its fine economy. Both cars handle with a lightness and quick response that inspired us to try better tires, and that begs for faster steering to complement it fully.

The Tempest is a refreshing car to live with, too. Its ride is smooth and supple and its interior is as crisp, light and airy as it is genuinely roomy. Pontiac meant the Tempest to be different, to have a clear-cut personality of its own, and it does indeed differ from its bigger brothers as much as the imported sedans do that inspired the Tempest's arrival in the first place. It's a driving experience no enthusiast will want to miss. —*SCI*

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The Marquis de Portago with world champion Juan Manuel Fangio at the French Grand Prix.

Alfred Neubauer, Stirling Moss (right) and Denis Jenkinson after their 1955 Mille Miglia victory.

The Cooper team, left to right: Jack Brabham, Bruce McLaren, John Cooper.

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Moss (11) and Brabham (8) taking a corner at the Dutch G. P. Zandvoort

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CONSERVATIVE CHARGER

Continued from page 39

at the La Junta, Colorado, SCCA races in June. The car was driveable, but Donner retired and handed the RSK over to his fellow townsman, John Max Wolf. The action represented more than generosity and trust. In races involving two drivers per car, Donner prefers to have Wolf as his second. At La Junta Wolf got some valuable experience though at fairly slow speeds. Donner thinks that way — ahead.

He failed to finish again in the Pike's Peak Hillclimb in July, an event in which he was heavily favored to win the sports car division on the basis of qualifying times. Donner's machine left the gravel road on a sharp 90-degree bend to the left about half way up the mountain. The Porsche came out with only minor damage and Donner shrugged off the incident, saying simply that he lost control of the car in the corner. Most Colorado race fans can't recall an incident of Donner spinning out on a hard surface in a race, and his frank admission of a goof sounded credible only because the Pike's Peak road has a graveled surface.

Months later Donner told us what *really* happened that day. Although the Peak is actually in Donner's backyard, he was not too familiar with the course, having never competed in the climb before. The run involves an ascent from a 7,000-foot altitude at the start to the 14,000-plus altitude at the top. In preparing for the race, Donner encountered carburetion problems, although not so troublesome as to keep him from making the best qualifying time for sports cars. The night before the official contest, he set up a new carburetion combination. As he roared up the hill, he went into a fairly straight stretch in second gear. On practice runs, the engine refused to attain maximum revs at that altitude — the vexing carb problem. But on that day when everything counted, the RSK engine pushed the tach needle right up the scale. Pleased, Donner grinned and shoved the stick into third gear. Again, the tach needle swung upward. It had almost reached the peak (equivalent to about 90 miles an hour with the gear ratios used for the climb) when the right-angle corner came up.

"It was probably one of the few times that a driver has left a course with a smile on his face," Donner said.

Family background may account in some degree for Donner's way of racing. The school of thought that describes a man with money as more conservative than one with not so much may apply in Donner's case. His paternal grandfather was the late William Henry Donner, the Philadelphia steel tycoon and philanthropist who died in 1953. Donner's father, Robert Sr., has been active in the affairs of Colorado Springs, including membership on the El Paso County Republican Central Committee. Back in the early 1950s when the late Senator McCarthy got a lot of people excited, Robert Sr. got a brief play in the newspapers when he announced formation of a secret committee that was to keep tabs on "subversion and Communist infiltration" in Colorado public schools. Since the fuss stirred up by that announcement died down, the Donner name has appeared in headlines outside Colorado Springs only on the sports pages. The name has been that of Robert Jr.

Whether Donner shares the political passions of his father is not known in Colorado racing circles. If he has any political views he keeps them to himself and goes on winning races.

In fact, the amazing thing about Donner is the complete lack of controversy about him. In the five years that we have followed racing in Colorado, we have yet to hear or find someone who dislikes the man. It stands to reason that anyone who wins as often as he does must arouse the ire of someone. There are those who envy him. Occasionally one of the also-rans will say that Donner wins because he has the green stuff. Yet the same person will turn right around and praise the Donner talents.

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ON SALE: MARCH SECOND

Evidently, one of the talents in the Donner kit is the knack of winning graciously.

Donner in some respects teeters on the verge of becoming the grand old man of Colorado sports car racing just when he has developed himself as a threat on the national scene. He shares his shop and parts bin with Mike Collins, 24, who recently acquired his own RSK. Previously he raced in a Carrera GT. To the extent that Collins wanted tutoring, Donner has filled that need well. Some of Donner's staunch fans say, in fact, that Collins will push his mentor a bit this season. Besides the help he's given Collins, Donner at some races seems like a walking shop manual. When someone gets into a mechanical jam, especially if it's with a Stuttgart machine, they look for the short, chunky blond guy wearing the white coveralls. He's also sought after as the source of information on how to take that bothersome corner. Several times he has been in charge of drivers' school at SCCA races, and has served in other official capacities as well. Off the course, business friends in Colorado Springs who own sports machinery sometimes gather for an evening at Donner's workshop to change oil, tune things up a bit and have a beer.

As a graduate of the hot rod school of

speed teaching, Donner grew up with machinery, and that experience tempered his own cautious inclination. He recalls that as a youngster he "built pretty good stuff from Fords but it always blew up." When the sports car bug began to spread over the land, it caught Donner's attention because racing came with sports cars "and that's the proof of the pudding." In 1953 he first raced in a sports car, an MG-TD (what else?). Later the same year he acquired a Jag XK120. He first looked at a Porsche sometime in 1952 but thought it was "too delicate" to stand up under rough treatment. But in 1955 he traded the Jag for a 1955 Porsche Coupe, which he now calls "the best car deal I ever made." The engine from this first love still runs in the chassis of Donner's 1958 Porsche coupe, tuned to the nth degree.

Donner has no plans to saddle up anything but a Porsche, and sentiment is only an incidental factor in his choice. On a tour through the one-time milk shed that Donner has converted into a shop on a former dairy ranch, he was asked why he didn't go in for larger machinery — Ferrari, Aston Martin, for example. A switch like that, he said, gesturing with his arms toward the shop walls, "would be throwing all this away." The shop is well stocked with spare parts, Porsche and other metric tools, shop manuals and factory bulletins. Since 1955 all of his racing and the great majority of his everyday driving has been in a Porsche. Getting into a different *marque* would mean throwing away five years of experience — an intangible that's far more valuable to Donner than tools or spare parts.

It's also his feeling that the Porsche people do more for a private owner than any other company does. Technical information and spare parts are sent in a hurry, he says. Moreover, Donner has the impression that the RSK, and before it the RS, were engineered along the relatively simple lines that a private owner, armed with some experience and technical information, can cope with himself.

"It (the RSK) should be a lot more exotic than it is," he said.

So long as Porsche puts out durable, potent machinery and maintains its present policies, Donner will continue to push its product.

These various reasons for sticking with the same make so long bring out one thing clearly. Donner is hard-headed and practical about this hobby of his. He drives what he drives because he thinks it gives him the most value for his money, big bore or small. Likewise, he drives as he does because he's convinced that the cautious method makes sense the same way — it takes him farther and faster. In races he remains essentially a businessman, accepting the risks of competition without adding to them unnecessarily.

Why does he race?

Donner was somewhat pressed to give a spontaneous answer.

"Well, I guess it's the natural thing to do."

Then he shifted into his verbal second gear:

"I get the most pleasure from the mechanical side of it. Sure, there's a hell of a thrill in the race, but the real satis-

(*Continued on page 92*)

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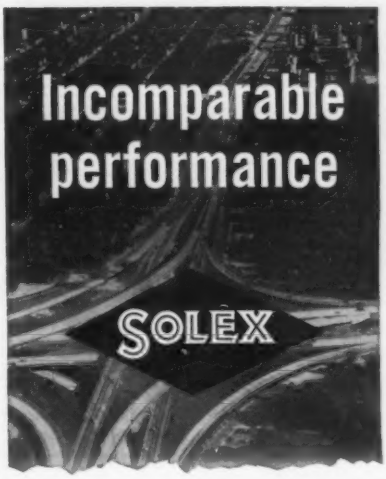

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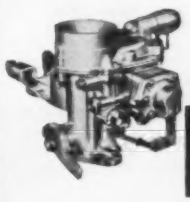

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(Continued from page 91)

faction comes from knowing that you did this and that and tinkered with something else and find that out on the course it goes. You find out how well you did when you test your machine against other machines. I like to make machinery work, by tuning it and by driving it."

Smoothness is the distinguishing aspect of Donner's racing style. From the time the driver and his car appear at a circuit, nothing seems hurried or pressing, in the pits or in a race.

Until race time, Donner's car sits alone and unattended in its stall with the engine compartment lid buttoned down. It stays that way throughout the meet while other contestants rush around changing a few things here and there in their cars. Asked why he leaves his car alone, Donner replied: "If you don't get it sharp before you leave your shop, you certainly aren't going to get it ready at the track; when I can't get the car ready, I leave it home and become a spectator."

Donner places little emphasis on the start of a race. The basic rule, he believes, is to stay away from everybody in the first two laps "when so many are trying to win and are banging metal in the process." If a driver has enough horses to grab the lead in the first lap, Donner says, that's fine because then he's really out of the mob's reach.

In competition he sticks closely to factory-recommended limits for the car. By driving within those maximums, he says, he can count on the engine staying together. If he jumps over the limit, he can't. He nurses his car and tires in another respect. While other drivers jerk their cars through corners in rapid arm thrusts and pulls, Donner's movements in the cockpit are an even and steady flow of motion, seemingly unhurried.

His reputation for smoothness has misled some of his followers who aren't too well versed in the art of race driving. We first noticed this at one of the Continental Divide meetings. On two corners leading into straights, Donner drifted across the road to the outside edge in every lap and kicked up a little puff of dust with his outside rear wheel. A Donner fan said this showed how consistently Donner approached the limits of adhesion on those corners and yet kept things under control time after time. Later a check with lap charts showed a variance in Donner's lap times — not a great difference but enough to say he was loafing in some laps and pushing in others. With the season over, we asked him about this apparent conflict. The little puff of dust, he said, had nothing to do with taking those corners fast or attempting to chalk up consistent lap times. He said he brings the RSK out of those corners — both in plain view of spectators — with the engine turning over near the bottom end of useable revolutions. To build up revs fast, he either points the car across the course to the outside edge or, if moving fast enough, drifts it across and lets the outside rear wheel touch dirt. For a moment before the limited slip differential takes hold, the outside wheel spins and the engine winds up a few hundred more revolutions. When the limited slip takes hold, the driving wheel on the course takes a bite of road surface and the RSK leaps forward without benefit of a gear change.

Such little tricks, Donner says, inevitably are picked up from race to race by any driver who is the least bit perceptive. Except for what others have shown him in competition in that fashion, Donner is a self-taught driver. He never had instruction in the sense of riding with someone who told him when to shift, how to drift and the accepted way of adjusting a seat belt. The late Ernie McAfee took Donner for one drive in the days when the latter was getting acquainted with sports cars and their ways. Donner still speaks of the experience with awe.

"Did he ever open my eyes!" Donner exclaims. "He did things with that car that I thought were against the laws of nature. Until that ride, I always thought you pointed the radiator cap of a car the direction you wanted to go. On that ride I learned a car is just like an airplane — by a slip or a drift you can actually travel sideways."

Since then Donner has learned how to do what he once thought was impossible, and to do it smoothly as well. Yet there are signs that Donner's restrained methods are the product of much self-discipline; that it's not always easy for him to keep his right foot from taking on a little lead weight. Usually he gives the appearance of being the quiet, calm type — the thinking man's driver, if you will. But on close and casual inspection, you suspect there might be something else in his makeup.

When he's not engaged in some physical activity, Donner finds it difficult to sit still. He squirms, much like a teenager in school on a warm spring day. One moment he's leaning forward intently, elbows on thighs. The next, he leans back in a slouch, legs struck straight out in front of him. He shifts his hands from behind his head, into his lap and on to his chin. When a topic arouses his interest, he primes his lips with a flick of the tongue. Asked whether he'd like to drive Le Mans and a few other races on the European calendar, Donner replied calmly that he'd certainly like to, but the press of business won't allow it. He followed with a rapid-fire explanation of how racing consumes time and how going abroad would magnify the loss. He sounded like a man practicing an argument to use on himself sometime if it should prove necessary.

If these are the distinguishing characteristics of a man who instinctively approaches a race like a calculating machine, then Fangio was a raving extrovert.

For last season Donner acquired some odds and ends from the Porsche factory that kick his RSK out of Class F and into Class E. An RSK with a 1600 cc engine, Donner believes, gains more from the boost than you'd expect from the 100 cc involved. He expects to have some fun from the bigger engine.

"I want to see if I can tune this (the RSK) sharply enough to catch a two-liter Lotus," he explains. "Some of the other boys (meaning Porsche pilots) are doing the same thing. It should be an interesting season."

With the likes of Donner driving, this and future seasons might be just that.

—HG & DB

RACING CASINGS

Continued from page 45

British G.P. at Aintree was wet both sessions, so wear was naturally slight. Dry weather was forecast for race day, so Dunlop's expectations of tire life were based on data recorded the last time the Grand Prix was run at Aintree (1957), when it had also stayed fine. What they didn't at first realize, though, was that rain during the following practice had left the track with a virgin surface. Its abrasive state, not perceptible to the naked eye, came to light when Joe Bonnier retired his B.R.M. (through causes unconnected with tires) just beyond half distance. Bonnier's tires told a story that sent Vic Barlow hurrying to the pits of the faster surviving runners with words of warning, and signals in the same sense were forthwith hung out. Drivers, of course, are able to examine their tires effectively on the run. Wear, measured immediately after the finish, proved to have been nearly twice as high as in the '57 race.

The more experienced and intelligent G.P. drivers can keep accurate tabs on the condition of their tires even on very fast circuits like Monza. This capability was well demonstrated by Tony Brooks (Vanwall) in the 1958 Italian G.P., which he won at a 121.24 mph average. During practice the Dunlop technicians had observed a disturbingly high tread wear rate, which they immediately communicated to their clientele, notably David Yorke as manager of the Vanwall team (Moss, Brooks, Lewis-Evans) on which the Fort's hopes primarily rested. Brooks, the only Vanwall man who was to last seventy Monza laps, said he was sure he could act as his own traveling scrutineer, just so long as the pit jogged his memory by blackboarding a TIRES signal every five laps. This they did, and after Mike Hawthorn had stopped for a change of tires and lost the lead in the process, Tony went through to win on a single set of R5s. There was five laps of life left in them at the finish.

"When you have a tire problem," says Terry Hampton, recalling this episode, "the way to beat it is to fill in the driver and team manager on all the relevant facts. If you don't, you won't." Brabham and Moss, he adds, are among the tire boffin's best friends — as long as they know just what the score is.

Here, Dick Jeffrey cut in with another Monza reminiscence — Italian G.P., 1959. R5s, with or without the "D" suffix, come in two calibers, Speed and Normal. The latter, seldom used in the Grand Prix, are 2½ to 3 millimeters deeper in the tread than Speeds. You certainly wouldn't anticipate a need for Normals on a circuit like Monza, where the lap record that year was to be set at 128.13 mph, and Dunlop sure enough hadn't brought any over. In the first day's training the Coopers were wearing treads out fast, and Jeffrey broke it to John Cooper that at this rate his cars wouldn't last the race distance of 257 miles on single sets, even with the deepest treads Dunlop could supply from on-location stocks. Cooper brooded on that one awhile, then said his team would alter their cornering style to take some of the brunt off the back skins. Well, they did, with the interesting result that the *fronts* wore more rapidly during the second practice session but the rears held up better, to an extent that told Dunlop they'd now have just enough safe life for the full race. So it proved. (Incidentally, one pair of Normals had been discovered on an Elite that was running in a sideshow G.T. event — and was promptly borrowed for the benefit of the Moss and Brabham Coopers in the Grand Prix.)

Although Dunlop didn't share in the general tearing of hair and biting of carpets when it was announced that the Avus ring, with its steep banking, was to be used for the 1959 German G.P., the unroadlike conditions involved — very high lap speeds combined with artificially multiplied g. loadings — did pose some unfamiliar tire problems. A week or two before the meeting, using regular R5s with 3 mm buffed off the treads, Dunlop ran *in camera* tests at Avus in conjunction with B.R.M., and the very same tires were subsequently used for British G.P. practice at Silverstone.

Firestone, of course, (talking of banked tracks) was the belle of the ball at the two U.S.-dominated Monzanapolis meetings, Dunlop's outlet being limited to the Ecurie Ecosse Jaguars which, bred for Le Mans and anyway out-engined, rather gamely stuck their heads into the lion's mouth. However, considering that lack of clearance inside the D-Types' sports-racing bodies restricted the tire size to 6.50 x 16 inches, it's of interest that for Monzanapolis II, Dunlop budgeted for a *race* speed ceiling of 170 mph average, using the same type of tire Ecosse had run at Le Mans. At the time, some reports excused the Jags' lowly placing on the grounds they had to be held to a restrictive ceiling imposed by the tire makers; actually, the limit set by Dunlop was comfortably above the cars' inherent capability.

The real tire killer is Goodwood, which, while it stages no F.1 event of G.P. length, does have the three-hour Tourist Trophy. "In the TT's three hours," says John Sambrook, Assistant Racing Manager, "our fitters have more work on their hands than in Le Mans' twenty-four. One set of our tires lasts a 250/GT Ferrari eighteen hours at Le Mans — and 50 to 55 minutes at Goodwood. On the Ferraris and Astons, abrasion of tread rubber averaged 150 pounds per car in the TT — just gone, vanished without trace. In a 1960-size field, we calculated the total rubber loss at about 1670 pounds."

Dunlop's pre-planning for each meeting on their program is done six to eight weeks in advance and revolves around:

1. Circuit to be used and race distance.
2. Character and condition of the surface.
3. Speed potential.
4. Local air temperature.

These factors are either known or can be calculated, and enable the requirement to be assessed in terms of tire size and construction. The three essentials to be ensured are speed performance, tread life and roadholding, and these in turn are the basis for the supply requisition filed with the sales department. British *equipes*

(Continued on page 94)

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(Continued from page 93)

like B.R.M., Cooper and Lotus truck their wheels to Fort Dunlop about a week before scheduled date of departure for the race *venue*; Dunlop then fits the tires and balances the assemblies complete, leaving inflation until the parties concerned rendezvous at the circuit. As an example of the magnitude these operations can assume in a special case, when B.R.M. was readying last October for a roundtrip campaign that would start at Riverside, continue in Australia and wind up in New Zealand, Dunlop's contribution was 38 fitted wheels and tires and more than 80 additional covers.

At a G.P. training session the duties of the attendant Dunlop technician, usually Vic Barlow, follow this pattern:

1. Check that all cars have the recommended equipment fitted. As the entry will include *equipes* and/or individual runners whose bases aren't within road transportation range of the Fort, and who therefore won't have predelivered their wheels to Dunlop for tire fitting, this isn't a foregone conclusion.

2. Set pressures on all cars reporting for training.

3. Immediately, but *immediately* following serious practice laps ("You've got to be quick," says Hampton), measure tread pattern depths and take temperatures corresponding thereto; make an interim note of these factors, bracketed against lap times ascertained from the team manager.

4. Ask each driver whether he has any particular tire problem. If, as you hope, he hasn't, the whole operation – measuring, taking temperature, interrogation – will take about one minute per car/driver, which is as much as you can spare with runners coming in off the circuit inconveniently bunched, as they often are.

5. Transfer all data to chart blanks.

6. Back at the hotel after training finishes, (a) calculate what temperatures the charted tires will be developing at progressive stages of the race (a new tire, with its full tread depth, gets hottest at the crown, a worn one at the shoulders); (b) plot a graph from recorded temperatures and check whether revealed average is on the right side of the known safety limit.

In a big field, and particularly one that includes a proportion of drivers and cars of lesser caliber, there obviously isn't any point in taking and recording data from every runner. Typically, Dunlop screens the fastest fourteen or thereabouts, making sure the take is representative of all makes present and doesn't miss out anybody of high placement potential. "But we're always ready to lend our ears to any driver, no matter how he's doing or what his status," adds Dick Jeffrey.

As far as pressures are concerned, Dunlop doesn't bind itself to the book too rigidly. If for instance an individual driver who knows his business wants a mite of nonstandard oversteer, Dunlop will give him the front/back pressure differential that provides it, only stipulating that his inflations stay that way for the race as well as practice. Once in awhile, too, Dunlop people find themselves forced into the role of guardians of the public safety. A couple of years back, at a famous continental meeting that included a curtain-raiser for sports cars, John Sambrook espied an alarmingly dilapidated bucket which, presumably under hypnotism from its youthful and lighthearted codrivers, the scrutineers had passed for action. Assuming the thing could creep as far as the start line, it could only be a matter of time before it went up a tree, likely killing a few spectators en route and leaving survivors to point accusing fingers at its Dunlop tires. Sambrook raised hell with the organizers, who fortunately saw it his way and ousted the offender.

At races like the Portuguese G.P., where qualifying standards may err on the lenient side and the language barrier adds to the difficulties of interrogating native borderliners during practice, Dunlop people always make a point of combing the town the night before the event and taking a good close look at the local boys' tire equipment. Coroners' inquests are too late for pleas like "We didn't know he was using our product; in fact we never met him in our lives."

Elaborate as Dunlop's indoor test equipment is, it merely complements, and certainly could never replace, the results of track tests carried out for the company by

(Continued on page 96)

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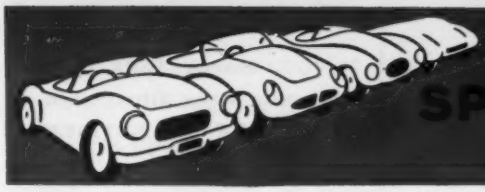

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(Continued from page 94)

such drivers as Moss, Brabham, Salvadori, Brooks, and Fairman. These men, says Terry Hampton, have "sensitive bottoms," and interpret tire behavior with uncanny flair. One of the few phenomena that even their bottoms likely couldn't sense is wave or ripple, a dangerous byproduct of underinflation, but in practice a racing tire would seldom if ever be allowed to operate under conditions capable of generating deadly ripple. Machine tests, carried out under movie camera surveillance, are used for obtaining wave data, and here of course the almost inevitable disintegration imperils nobody.

Wirewalking on safety limits, or "tire brinkmanship" as Hampton calls it, is something that Dunlop never will indulge in. If your tire is on margin for heat, you're caught with your trousers down when somebody unexpectedly conjures an extra 5 mph out of their cars. Apropos, he and his superiors view Formula 1's new 1½-liter limit with composure. Speeds, initially anyway, may be slightly slower than heretofore, some cars will probably be heavier than their 2½-liter forebears (e.g., Lotus), and the tire boffins' tasks may in one sense be simplified by the uniformity of car weights that the new formula should bring with it. Dunlop has already developed and proved a new tire especially for these cars.

Racing tire design is too recondite a subject to be tackled in any detail here, but it's obvious to anyone frequenting the Grand Prix scene that one trend in recent years has been away from a roundish cross-section and towards an approximate D shape. Rim widths have increased, too. You can do a lot for roadholding, says Dunlop, by considering tread width and profile: you know your car weight, then you design for maximum contact area. To quote verbatim: "Thanks to recent developments in materials and design techniques, the modern racing tire, evolved in the light of indoor testing and track testing with car constructors' close collaboration, would have been considered revolutionary four to five years ago. Once we've arrived at a design that is right in theory and passes its indoor tests successfully, we aim to track-test it at many circuits, on every competitive type of car, with every driver whose opinion matters."

The progress of a new tread pattern, such as the R5's distinctive mosaic of wide Y's spanning the tire laterally, follows this course: 1) The experimental pattern is drawn on a blank tire tread in white ink; 2) It is cut out by hand, a process taking about three days, with a plus/minus tolerance of 0.005 inch; 3) It's tried out on the Fort's own proving ground; 4) Finally, if these trials prove satisfactory, it's tested by a top driver on a race circuit.

"It's no use producing a tire the day after the race has taken place," says Dunlop, and they are lucky in commanding all the desiderata for putting new programs through fast. When, for instance, Porsche called on the Fort to keep them off the rims in last year's Buenos Aires 1000-Kilometer Race, just three weeks sufficed for preparing a mould, producing samples, building the requisite sixteen tires. Four weeks would have been too much, but Don Badger's men, by the beard of John Boyd Dunlop, made it in three. *—DM*

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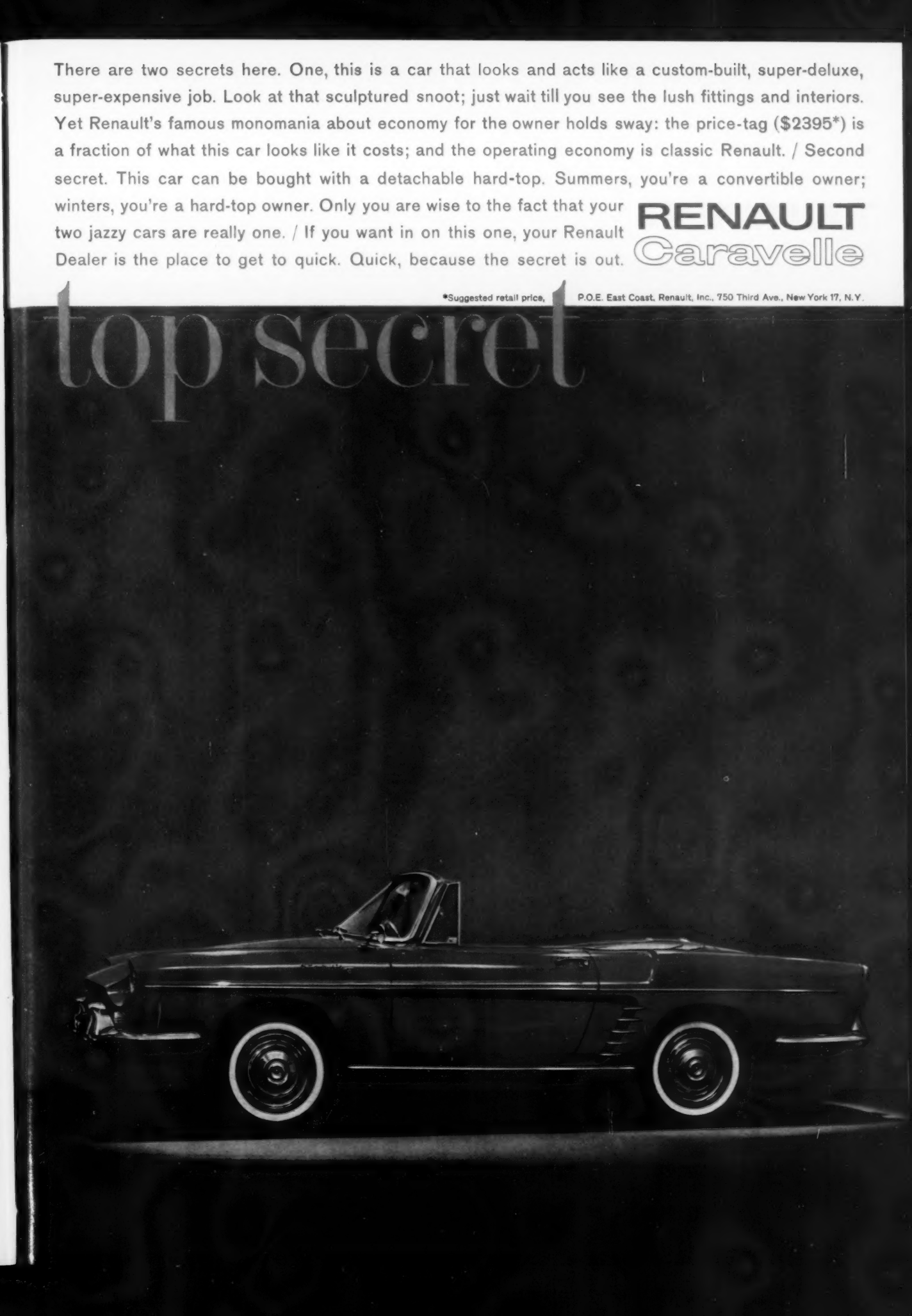

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